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Forum on the Involvement of the University of California in Nuclear Testing at Lawrence Livermore and Los Alamos National Laboratories

Senate Committee on Health and Human Services

CALIFORNIA LEGISLATURE

SENATE COMMITTEE ON
HEALTH AND HUMAN SERVICES

SENATOR DIANE E. WATSON, CHAIRPERSON

FORUM ON THE INVOLVEMENT OF THE UNIVERSITY OF CALIFORNIA IN NUCLEAR TESTING AT LAWRENCE LIVERMORE AND LOS ALAMOS NATIONAL LABORATORIES

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Sacramento, California

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HEARING

CALIFORNIA LEGISLATURE

SENATE COMMITTEE

ON

HEALTH AND HUMAN SERVICES

In the Matter of:

FORUM ON THE INVOLVEMENT OF THE UNIVERSITY OF CALIFORNIA IN NUCLEAR TESTING AT LAWRENCE LIVERMORE AND LOS ALAMOS NATIONAL LABORATORIES

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WEDNESDAY, FEBRUARY 11, 1987

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COMMITTEE MEMBERS PRESENT

Senator Diane Watson, Chairperson

Senator Ken Maddy, Vice Chairman

Senator William Campbell

Senator Dan McCorquodale

Senator Herschel Rosenthal

OTHER LEGISLATORS PRESENT

Senator Art Torres

Assemblyman John Vasconcellos

Assemblyman Tom Bates

Assemblyman Tom Hayden

STAFF PRESENT

Ms. Jane Uitti, Consultant

INDEX

--oOo--

INDEX (Continued)

--oOo--

INDEX (Continued)

--oOo--

--oOo--

PROCEEDINGS

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CHAIRPERSON WATSON: I'd like to call the hearing to order and wish you a good morning and welcome you to the hearing on the Involvement of the University of California in the Management of the Lawrence Livermore and Los Alamos National Laboratories. Today's hearing is co-sponsored by the Senate Health and Human Services Committee and Assemblyman John Vasconcellos.

I would like to introduce the members that are here at the current time. Over on my far left and your right is Assemblyman Tom Hayden. Next to him is Senator Bill Campbell. Next to him is Senator Ken Maddy. Assemblyman John Vasconcellos, who is a co-sponsor, and Senator Hersch Rosenthal on my right and your left.

I want to thank you and inform the audience and the witnesses that members will come and go during the course of the hearing, which goes from 10:00 to 4:00. We will break somewhere around the noon hour for an hour, hour and fifteen minutes. We'd like to invite the audience to stay with us until the end of the hearing if they may.

Members of the Committee, the various witnesses have asked that, if you can, you would hold questions until the end of the panel. If there is a burning issue you want to raise, then we'll recognize you. But it's a feeling that most of the information will be given during the course of the panel.

I want to extend my special appreciation to the

Southern California Federation of Scientists, who suggested the names of the renowned scientists with us today and arranged for them to be here. They went so far as to raise money to be able to bring the witnesses from around the country to take care of the technical assistance that you have in the room today. They worked very hard to bring this issue. I also want to thank the University of California for their cooperation.

They say that you can't get out of this world alive. That's why we're here today. This Committee and a large body of internationally respected physicists and nuclear weapons design experts are highly concerned about the continued increase in the numbers of nuclear weapons when the Soviets and the United States already have enough bombs to kill all of us on this planet many times over. Yet we are told that the only two nuclear weapons laboratories in this country, both run under the auspices of the University of California, have policies that oppose a nuclear test ban treaty.

The University of California manages the Los Alamos National Laboratory and the Lawrence Livermore National Laboratory, whose principal mission is nuclear defense. The labs have the responsibility for the design, testing, production, military stockpile surveillance and stockpile retirement of nuclear explosives.

The budget for fiscal year 1987 will be about $1.8 billion. The contract with the federal Department of Energy, which is renegotiated every five years, will be before the University Regents in September of this year. The two labs

employ roughly 18,000 University of California staff.

There has long been debate centering on the University's management of the laboratories. Although a majority of Regents have reapproved the contract each time it has come up, there has never been a consensus among faculty, students or the general public about the appropriateness of the University's involvement.

The key issues that will be discussed here today center around several major themes: First, do the labs support the concept of a comprehensive nuclear test ban? If not, why not?

Second, to what extent are arguments about the alleged unreliability of surveillance of a nuclear treaty based on scientific fact or to what extent are they based upon political considerations?

Third, to what extent do the labs attempt to influence federal policy on nuclear weapons development and testing?

Fourth, just what are the labs doing? Are they testing existing weapons for reliability to see if they work or are they developing new Star Wars laser technology? Is what they're doing consistent with the support of the last five presidential administrations for a comprehensive test ban treaty?

Fifth, should the management of the labs be under the auspices of a highly respected educational institution like the University of California? If so, should the University and the Legislature have any greater control or

oversight over the function and involvement of the laboratories than they currently have?

Lastly, should the state's environmental impact laws require that both labs develop environmental impact reports that not only address the safety of nuclear testing and the disposal of nuclear waste and other safety and environmental issues, but also should they address the consequences of the development of nuclear weapons?

In case you're not sure what I'm referring to, I'm talking about the consequences of a nuclear holocaust, which I'm sure would affect at least a few Californians.

So, you can see that we're here with a very full agenda. We're here as legislators who are interested in the issue and we have with us an exceptional group of internationally-known scientists who will give us technical information on bomb testing and reliability of treaty surveillance. We also have the top officials from the University of California and from the two weapons laboratories to give us a perspective on this highly controversial issue and the relationship with the two laboratories.

This is not to be a judgmental hearing and this hearing will not immediately result in any kind of legislation. This is an exploratory hearing. We're trying to get the issue out on the table. The interests of the Health and Human Services Committee and the members of the Legislature is how the relationship of our University of California with lab testing will affect the citizens of

California, how their health and safety is involved.

So, this might be the first of similar hearings. We might find that we have enough information that we might want to move into public policy. That is still yet undecided. So, that's what our hearing is about and I thank all of you for coming. I'd like now to call on our co-sponsor, Assemblyman Vasconcellos, for a few remarks.

ASSEMBLYMAN VASCONCELLOS: I simply want to have us begin the hearing. It seems to me that the University of California is a public institution with the public trust of the people of California and I believe the people have the right to know what is happening and to find out whether in fact the University is operating in a way that is carrying out this public trust. These scientists, who are the experts, are best prepared to advise us and the public about what's happening and the appropriateness of it and I'm here to hear what you have to say.

CHAIRPERSON WATSON: Senator Campbell.

SENATOR CAMPBELL: Just before we begin, Madam Chairwoman. Are we going to stick strictly to the parameters of the role of the University in relation to the labs or are we going to make it much more broad based than that?

CHAIRPERSON WATSON: Let me give you a description of how it's structured for today.

SENATOR CAMPBELL: I just wondered what the parameters are that we're going to discuss.

CHAIRPERSON WATSON: We're going to stick pretty much to the topic that is described in your agenda. The

people that are here as witnesses have been given questions that they are pretty much to address. The Committee members certainly will be able to raise comments and questions as we move along.

So, I'm sure that the discussion will be as broad as members want it to be.

Senator Campbell, let me give you your right name tag -- you're certainly not Senator Royce -- so that members of the public will know who you are.

SENATOR CAMPBELL: I'm about two of Senator Royce.

CHAIRPERSON WATSON: Yes, you're about two of Senator Royce.

I would also like to welcome Assemblyman Tom Bates to the panel.

Members of the audience and witnesses, we're going to have three panels. The first panel will deal with the history on the University of California's involvement in nuclear testing contracts and its influence on Comprehensive Test Ban negotiations. There are several speakers both from the University and the scientific community.

Panel II will deal with the conformity of laboratory operations with national policy priorities.

The third panel is recommended changes in the operation of the nuclear weapons laboratories.

All of the panels will have witnesses from the UC system and the California Federation of Scientists. There will be an opportunity for some of the witnesses to come back after each panel, if necessary, to maybe rebut something that

has gone forward. We will try to stick as much as possible to the agenda so we can get through all of our witnesses in a timely fashion.

I'd like to call on first Dr. William R. Frazer, Senior Vice President for Academic Affairs with the University of California.

Dr. Frazer.

DR. FRAZER: Thank you, Madam Chair, members. I'll do my best on this --

CHAIRPERSON WATSON: Would you reintroduce yourself.

DR. FRAZER: I'm sorry. William Frazer, University of California, Senior Vice Present for Academic Affairs.

I'll do my best to present the University's views on this broad topic you have before you today. I will deal with the relationship between the University and the laboratories at Los Alamos and Livermore.

CHAIRPERSON WATSON: Excuse me, Dr. Frazer. I'd like to also introduce to the audience Senator Dan McCorquodale, who has joined us.

Proceed.

DR. FRAZER: I believe it would be helpful to your Committee if I described three very important aspects of the relationship: The responsibilities and authorities of the several parties involved, the rationale for the operation of these laboratories by the University, and the means by which the University carries out its contractual responsibilities in managing the labs. The third of those topics I'll save for Panel III in the afternoon.

I've given you written testimony. I don't intend to read it to you. I intend just to summarize and pick up some highlights.

Let me start by first describing the respective roles of the federal government, the University and the laboratories as they relate to the design, testing, production and stockpile assurance of nuclear weapons. I'll start with the federal government, which owns the laboratories and, of course, funds all the nuclear weapons work done there.

My purpose, incidentally, in presenting this to you is so that you have a clear idea of what is within the purview of the University and what is not.

The federal government is responsible for policy and for the programmatic requirements in all aspects of nuclear weapons. It discharges the production and deployment aspects of this responsibility through two cabinet-level departments -- the Department of Defense and the Department of Energy.

The research, design, development, production, stockpile monitoring, retirement of nuclear weapons is the responsibility of the Department of Energy. The Regents of the University have contracted with the Department of Energy to operate the two weapons design laboratories. This relationship has existed since the time of World War II. The principal basis for the continued relationship is the acknowledgement of the University's role in infusing high standards of research, technical performance and objectivity

and in isolating personnel from the politically-driven processes of government. I'll speak further on that subject later.

It's the responsibility of the University to manage the laboratories according to our personnel and management policies, to carry out the nuclear weapons program as established by the federal government and to ensure that the laboratories execute the technical programs with the highest possible quality. The staffs of the laboratories are University employees.

The University does not establish the goals or the general content of the research and development programs that are performed at the laboratories. This is true for both the nuclear weapons programs and the other programs that the laboratories conduct. The programmatic content is established, at a high level of aggregation, by the federal budget process. The tasks to be done are then defined at a greater level of detail by Department of Energy officials within the broadly-defined mandate of the legislation. The scientific and technical execution is done by the laboratories. Initiative is expected and much flexibility is allowed.

The process I just described is not always completely descriptive of how the system works. The laboratories are and are expected to be far more than mere executors of orders. New technical developments made by the laboratories have often led to new weapons systems of qualitatively different capability. But the role of the

laboratories is to develop and offer innovative technology options, not to make policy. The decisions related to ultimate deployment or ultimate supportive decisions as to which research programs will be pursued are eventually not the laboratories.

Let me now proceed to the second topic of my presentation, the involvement of the University of California. As I mentioned previously, this involvement dates back many decades. First let me present a few facts about the relationship.

The University has managed the laboratories since their inception -- Los Alamos in 1942, Livermore in 1952. The initial involvement was the fact that it's the University that manages the laboratories is largely a historical fact that J. R. Oppenheimer and E. O. Lawrence were professors at the University of California.

The current combined budgets of the two laboratories exceeds 1.8 billion per year. Somewhat over half of this is weapons related.

The management fee received by the University amounted to $7.3 million in fiscal year '86. It's negotiated as compensation for management expenses incurred by the University. In other words, the University budget does not profit from the relationship. Or to put it more clearly, the University is not in this for the money.

The association of the University and the weapons labs is not without controversy, as I don't need to tell you. The appropriateness of the relationship has been the subject

of numerous inquiries and reports and was most recently discussed and very thoroughly discussed by the Board of Regents of the University over the course of about a year before they decided last September to seek renewal of the contract.

In their consideration of continuing the association, the Regents of the University have emphasized that the chief reason for doing so is public service, one of the missions of the University. It is their belief that the University serves an important national interest through its management of the laboratories and through its oversight of the conduct of various research programs, including national security.

The University performs this public service in managing the laboratories in such a way that their programs and personnel are of excellent quality. The University brings to the laboratories the tradition of debate and intellectual questioning by providing an environment in which the scientists of the laboratories provide policymakers with a source of independent technical advice.

The Regents are keenly aware that the association is not without adverse effects. Some criticize the University for its association with weapons of mass destruction. Others assert that it's simply not the job of a great university to be involved in activities so far from the mainstream of University activities and that such involvement inevitably hinders the attainment of the University's principal goals.

In their most recent consideration of the

University-laboratory relationship in September of '85 the Regents voted to enter into negotiations for extension of the contract for five years. Again, the primary consideration was the service that the University provides to the nation.

At that time the Regents also expressed the desire for greater collaboration among the campuses and the laboratories. Collaboration is beneficial in many ways to both. The laboratories have unmatched facilities and broad scientific and technical expertise; while the campuses contribute not only their outstanding faculty, but also students.

I would like to conclude this part of my comments by quoting from the report of a committee that was established in December 1978 by the federal government to consider whether satisfactory alternatives were available in the event that the University should decide not to continue the relationship. That committee found -- and I quote:

> "It is of the utmost importance that the U.S. retain, in the crucial and controversial area affecting nuclear deterrence, people who are at once technically outstanding and as independent as possible from bureaucratic and political restraints on the expression of unpopular views. The combination of the University, laboratory and relevant government

management has served this end to date. We believe this combination should be preserved."

I'll continue my remarks in the afternoon.

CHAIRPERSON WATSON: Thank you, Dr. Frazer.

I would now like to call up Dr. Paul White from the Center for National Security Studies, Los Alamitos (sic) National Laboratory.

SENATOR CAMPBELL: Madam Chair, did you want to wait until the whole panel has finished before we ask questions?

CHAIRPERSON WATSON: We would prefer to do it that way unless there's something that --

Let me correct my pronunciation. Los Alamos.

Dr. White.

DR. WHITE: I'm Dr. Paul C. White, Associate Director of the Center for National Security Studies at Los Alamos National Laboratory.

Madam Chairman, ladies and gentlemen, it's a pleasure to be here today with my colleagues to tell you a little bit about certain aspects of the nuclear weapons program conducted at the national laboratories operated for the Department of Energy by the University of California.

In particular, I should like to review from the laboratories' point of view how it is that these laboratories have derived their responsibilities in this area of such great national importance. I shall strive to make clear to you those areas of responsibilities that are sharply defined for the laboratories by United States policy and law and

those areas in which the laboratories exercise their respective technical judgments about how best to meet these responsibilities.

In order to do this, I shall first address my remarks to a brief outline of the United States national security policy and the role it defines for nuclear weapons. Then I shall describe how the Congress has in turn defined very specific actions in the implementation of this policy to be the responsibilities of the Department of Energy national laboratories, including Los Alamos and Livermore.

Finally, I shall provide a broad outline of the research, development and testing programs set up by the laboratories in order to fulfill these assigned responsibilities.

My colleague, Dr. Brown, will then elaborate somewhat on more details of these programs; particularly as they relate to nuclear weapons. I hope that you will find these remarks helpful during your deliberations.

I shall begin by observing that there are, of course, many facets of national security. In addition to its defense or military aspects, U.S. security clearly involves such other areas as economic strength and the quality of the education programs through which young people are prepared for life in this country. We concentrate today, however, on the defense aspects of U.S. national security policy and we note that a principal goal of this policy has long been the deterrence of conflict. Since the advent of nuclear weapons some forty years ago it has, of course, been an overriding

concern to deter nuclear conflict in particular.

Safe, secure, reliable and effective nuclear weapons are central to success in achieving this goal of deterrence. The United States policy has developed over the years a set of requirements for the nuclear forces necessary to implement the various objectives of this deterrent policy. These include, of course, the deterrence of general nuclear war. They also include the coordinated deployment of nuclear forces together with conventional forces to deter conventional conflict.

The implementation of this particular U.S. policy objective is seen most clearly in the European theater, where so-called tactical nuclear forces are used in combination with NATO conventional forces to offset certain foreign power advantages in conventional forces. Our national security policy has so far been successful in each of these areas.

United States policy has, however, consistently looked beyond the status quo. A major goal of current and past policy has been to look toward a future with less reliance on nuclear weapons. In various ways every administration with responsibility for nuclear weapons has pursued this goal. Each has defined a set of arms control objectives to reduce the likelihood of nuclear conflict and to limit the numbers of nuclear weapons.

Some administrations have sought to enhance the capabilities of conventional forces in order to provide alternative means to deal with possible confrontations. The current administration has encouraged research into the

possibility for defensive technologies to reduce the threats posed by nuclear weapons. Over the years the Department of Energy laboratories has been called upon to support each of these aspects of U.S. national security policy.

None of these laboratory responsibilities is so carefully and explicitly defined by congressional action as those in support of the national policy of nuclear deterrence. To illustrate the nature of this legislative assignment, let me call to your attention some specific language used with the National Defense Authorization Act for the current fiscal year 1987. I'll be quoting fairly liberally from the document and I won't bother to identify explicitly where I'm quote. But the sense is always accurate and I will submit a written copy for the record which will identify those quotations. To begin with -- and I quote: "The Department of Energy is responsible for all aspects of nuclear weapon activities except those of the Department of Defense."

It is explicitly noted further that in pursuit of these activities, the laboratories shall conduct "... research and development programs for weapons..." Furthermore, the authorization requires that these weapons programs shall include "... research, development, engineering, testing and production of nuclear weapons; maintenance of reliable weapons for their stockpile lives; and the retirement and disposal of nuclear weapons from the stockpile..."

Quoting further, "The objectives of the research,

development and testing effort are to explore and provide new technologies necessary to maintain U.S. nuclear deterrent forces and to maintain a unique national capability to design, test and monitor the U.S. nuclear arsenal for reliability, safety, security and effectiveness ..."

The congressional language goes on specifically to charge the laboratories to continue conceptual studies on certain authorized new weapon systems such as, for example, the warhead for the new small ICBM.

Looking further towards the future, the laboratories are specifically charged to conduct "... research on the feasibility of innovative applications of nuclear technology that may eventually be important." One particular example in this area is the work in support of the Strategic Defense Initiative. This kind of longer range research serves, in addition, to guard the United States against the possibility of technological surprise by an adversary.

The Congress goes on to detail the nature of the nuclear testing program in support of these broader programs. The laboratories, together with the Department of Energy, are to conduct a number of nuclear device tests during fiscal year 1987 and explicitly to prepare for testing in future years. These nuclear tests are expressly to be related to "proof-of-concept", "development" "determination of the state-of-the-art", "maintenance of stockpile reliability" and "to the maintenance of testing capabilities."

I hope that this brief review of congressional charge to the laboratories helps to make clear how the

nuclear weapons laboratories are provided by Congress with very specific policy guidance for the support of U.S. national security.

Given this legislative guidance, however, it then becomes the special and unique responsibility of the laboratories to exercise their technical judgment, experience and wisdom in constructing technical programs to carry out their defined areas of responsibility. Let me now briefly describe these broad elements of laboratory programs for research, development and testing in support of national policy.

First of all, there is a program to assure continuing confidence in the effectiveness of the existing inventory of nuclear weapons through stockpile sample and non-nuclear testing, supplemented by occasional nuclear experiments and vigorous analysis of all available data. The laboratories implement their assigned responsibility for new weapon systems through specific programs to improve the safety and the security, as well as to upgrade the operational capability of the stockpile.

In order to assure that warhead designs will accomplish their assigned objectives, the laboratories conduct programs to assess the effects of nuclear explosives. To a closely related effort, programs are conducted to understand the potential vulnerability of warheads to their intended operational environments. Where problems might exist, design solutions are sought to ensure that warheads will survive to accomplish their assigned missions.

In fulfilling these responsibilities to the future, the laboratories have programs defined to explore advanced concepts for the application of nuclear weapons science. Through this effort, the limits of technology are made known and the most advanced capability is made available to support national need. In addition, each of these program areas requires the latest scientific understanding derived from vigorous research in such key fundamental areas as materials science, high explosives science, computational science and a whole spectrum of fundamental scientific research.

The weapons development programs that I've just described deserve a bit of elaboration in the context of this hearing. In the responsible conduct of these programs, the nuclear weapons laboratories maintain a clearly defined set of goals.

New weapon designs must strive to meet criteria for military performance that are set in consultation between military planners and laboratory representatives knowledgeable about the limits of nuclear weapon design capability. But these criteria are only approached to the extent permitted by the additional requirements of nuclear safety and security.

Furthermore, in attempting to satisfy these objectives, scientists and engineers draw upon all available technical understanding to ensure that weapons are designed for maximum operational reliability and maximum stockpile life.

In addition, I should like to point out that these

programs of research and development of nuclear weapons rest on a solid foundation of classical scientific method. That is, each of the elements necessarily involves both theoretical and experimental work. Each program area is based on vigorous fundamental research in relevant technical disciplines.

The understanding derived from this research is then applied to appropriate areas of weapons technology. To remain scientifically sound, these programs of applied research cannot be separated from experimental validation, including carefully chosen underground experiments.

In this connection, it then becomes an additional responsibility for these scientific institutions to make policymakers aware of any and all technical risks associated with testing limitations. It is then the responsibility of the policymakers to assess the trade-offs between these technical risks and the perceived benefits to be derived from such possible limitations.

In conclusion, let me remind you of an additional element of modern scientific method. Science requires that new ideas, new theories, new interpretations of experiments all must be exposed to critical review by others. Out of this cycle of theory, experiment and peer review science develops new understanding and finds better solutions to old problems.

Nuclear weapons science is no different in this regard than any other science. Careful technical research and development programs, including occasional underground

nuclear experiments and combined with a technical review process assures the high standards of excellence to be expected from laboratories associated with the University of California.

These standards of excellence also assure the quality of support for the U.S. national security policy of of nuclear deterrence so that at the same time the other policy goals of reducing our reliance on nuclear weapons can be pursued.

Thank you very much for this opportunity to speak with you this morning. At the appropriate time I'd be happy to participate in any questions.

CHAIRPERSON WATSON: Thank you, Dr. White.

I'd like to now call on Dr. Paul S. Brown, Assistant Associate Director for Arms Control with the Lawrence Livermore National Laboratory.

DR. BROWN: Thank you, Madam Chairman. My name is Paul Brown. I'm with the Lawrence Livermore National Laboratory.

You introduced us earlier, some of us, as administrators from the weapons laboratories. Indeed, that we are. But I would also like to emphasize that Dr. White and I are also scientists with years of experience in the weapons program. We'd be happy to answer any questions later along those lines. I will be talking about nuclear weapons research and development and the role of nuclear testing.

In recent years there have been increasing pressures for more restricted limits on nuclear testing, including a

Comprehensive Test Ban. There is a widespread perception that nuclear testing fuels the arms race. I disagree with this perception. But because this perception exists, more restrictive test limitations can have political benefits primarily by allaying the fears that people and nations have about the threat of nuclear war. In assessing these benefits, we must also consider the potential costs.

Dr. White has already gone into the national policy aspects with respect to weapons. I will not repeat what he said except to say that restrictive test limitations cannot be achieved without incurring technical costs, which could threaten the credibility of our nuclear weapons. The loss of credibility could result in severe political costs as well.

It is the difficult responsibility of the federal government to weigh the advantages and costs of nuclear test limitations. It is the responsibility of the weapons scientists and the laboratories to advise the government on the technical costs of more restrictive test limitations and it is the responsibility of the University to foster an environment in which the laboratories can provide technical advice independent of political pressures.

In the remainder of my presentation I will discuss the potential impacts of test limitations on nuclear technology.

There are four fundamental reasons why we do nuclear tests. First, to maintain confidence in the existing stockpile; second, to modernize the stockpile for improved safety, security, survivability and effectiveness; third, to

assess the vulnerability of weapons to the nuclear threat environment posed by the weapons of our adversaries; and, fourth, to avoid technological surprise by maintaining the scientific judgment necessary to assess the significance of real or claimed advances in weapons technology, both nuclear and non-nuclear.

I will address these four reasons in order. First of all, stockpile reliability.

Within the constraints of the military requirements, the weapons in the stockpile and currently under development have been conservatively designed to avoid as best possible the adverse effects of aging. Correcting a problem in the stockpile is extremely expensive and time consuming. Scientists and engineers strive to make their designs durable and robust against all foreseeable conditions encountered in the course of a weapon's existence.

Nuclear weapons, however, are complex mechanisms made of highly reactive materials and sometimes of necessity they include materials of limited lifetimes. Because of these characteristics, changes have occurred in stockpiled weapons that have raised the question of whether a weapon would perform as designed. In most cases scientists have been able to assess and fix these problems without nuclear tests. In doing so, however, they drew upon technical judgment that was based on years of experience in nuclear design testing.

Nuclear tests, however, have been necessary to fix problems. Since 1958 one-third of all weapon designs placed

in the stockpile have required post-deployment nuclear tests to fix design problems. In three-fourths of these cases the problems were discovered only because of the ongoing nuclear testing and additional tests were required to confirm that the fix was satisfactory. In some cases problems could have been solved without nuclear testing, but only at considerable expense or with significant uncertainties in weapon performance.

In 1958 to '61 the U.S. and Soviet Union observed a moratorium on nuclear testing. In effect it was a Comprehensive Test Ban. When certain weapon systems developed during the moratorium were finally tested, we experienced a number of failures. Even modern weapon systems considerably newer than those developed during the moratorium had problems that have been identified and resolved only by nuclear testing.

In one case -- that of the W68 warhead for the Poseidon submarine launched missile -- chemical decomposition of the high explosive -- we call it HE -- in the fission trigger necessitated a change to a more chemically stable HE, which is a major design change which required a nuclear test to certify that the new design would perform properly.

In this case we could have solved the problem by rebuilding the weapon every five years with the same HE that was deteriorating at tremendous cost to the taxpayer and we chose not to do so. We instead chose the most cost-effective and technically sensible solution.

In another case a final test of a weapon at its

specified low temperature extreme, a weapon that had already gone to the stockpile, resulted in only a small fraction of the expected yield. It was a dud. It necessitated a design change and another proof test.

It has been argued that nuclear weapons can be designed to be more robust to the effects of aging. They can be. However, it must be recognized that in specifying the requirements for new nuclear warheads, the Department of Defense prepares a set of military characteristics, known otherwise as MCs, that define the requirements. These requirements include first and foremost nuclear safety and then in order of priority size and weight, plutonium dispersal safety, yield and so on.

In the event that compliance with the MCs leads to a design conflict, the Department of Defense requires that priorities be observed in the order that I just listed.

There is an MC for stockpile endurance and replicability; but it is spelled out to be a desirable goal as opposed to a requirement, contingent on meeting all the other MCs.

I'll now address stockpile modernization.

The global strategic balance is constantly changing. New technologies and developments, both nuclear and non-nuclear, can weaken the credibility and survivability of the U.S. deterrent. They may also enhance credibility and survivability.

The tension between these two effects leads to a dynamic deterrent relationship among nations. In turn, this

can lead to changes in mission requirements for our nuclear forces or to changes in delivery systems, which might require either modifying existing warheads or developing new ones.

For example, Soviet missile accuracies are constantly improving, putting our land-based missile force at even greater risk from a first strike. We can use a number of technological solutions to enhance the survivability of our land-based missiles, including new systems that require new warheads.

One solution is to deploy mobile land-based missiles such as the Midgetman missile. To enhance its mobility and increase its survivability, the Midgetman must be lightweight; which in turn limits its ability to carry warheads, limits its throw-weight.

Because the Midgetman may have to travel over rough roads or rough country, its warhead must be designed to withstand long-term vibration environments. In addition, because of potential access by the public to deployment areas, its warhead must have appropriate safety and security features.

There is an ongoing debate in Congress now as to how large the Midgetman should be, whether it should carry a single warhead or multiple warheads. The debate is still going on. The ultimate choice of a warhead for the Midgetman awaits resolution of this debate and nuclear testing will be necessary to develop that warhead.

I'd like to point out that the Midgetman missile is a favorite weapon system of most of the arms control

advocates in Congress and some people have even dubbed it the Congressman missile.

The safety and security record of the U.S. stockpile is excellent. This success is due in large part to our continuing efforts to design safe and survivable warheads and to modernize the stockpile by incorporating new safety and security features into new and existing weapons. I'd like to point out that only one-third of our stockpiled weapons have these modern safety and security features.

I'd like to emphasize that no weapon accident has ever produced any nuclear yield. However, in two overseas airplane crashes the high explosive in the weapons reacted violently, dispersing plutonium -- which is an extremely toxic material -- into the vicinity of the crashes. There was no nuclear yield. But cleanup of the plutonium to acceptable levels was extremely expensive and the political consequences of these accidents were quite serious.

To avert such problems Livermore and Los Alamos scientists developed a new and sensitive high explosive that is now entering the stockpile in a variety of weapon systems. Insensitive high explosive is extremely difficult to detonate in the event of an accident such as the impact of a stray bullet or an airplane crash. Continued nuclear testing is required to fully include insensitive high explosive in the stockpile.

Nuclear effects testing and survivability.

A very important part of the U.S. nuclear testing program and a responsibility of the Defense Nuclear Agency is

to test the effects of nuclear weapons on a vast array of military equipment. Of particular concern are the non-nuclear components of our strategic weapon systems, warning sensors, communication equipment and so on.

As in the testing of nuclear weapons, we are frequently surprised by the results of nuclear tests on our equipment; equipment that has been previously subjected to non-nuclear tests. Unexpected results have been observed in effects tests on almost all of our strategic nuclear systems. Tests have revealed changes that had to be made and additional nuclear tests were usually required to certify the survival and proper functioning of these systems.

I'll now talk about the maintenance of scientific judgment, which is the problem of keeping people's skills going.

Ultimately, the viability of our nuclear deterrent rests on the judgment of our nuclear scientists. They must judge what technological developments by our adversaries might threaten that viability. It is inevitable that future stockpile problems will occur and requirements for new weapons will arise, just as they have in the past.

Weapon scientists cannot address the impact of new technologies. They cannot verify that a problem has been properly fixed or certify that a new weapon design will meet its military requirements on the basis of non-nuclear experiments alone, nor can they model with computers all the complex physical processes necessary to predict warhead performance with confidence.

Assessment of weapon performance rests on scientific judgment based on nuclear test experience. This judgment takes considerable time to develop, is cultivated by the application of theory and experiment to device design and it is continually refined on the basis of data from nuclear tests.

Removing the confirmation provided by tests would result in the overextension of judgment and the reduced credibility of the nation's deterrent. This indeed was the case during the moratorium that existed between 1958 and '61.

In conclusion, I would like to say that there are many who view a Comprehensive Test Ban as a top priority arms control measure. I believe that there are other arms control measures which should take precedence. These include major reductions in the most destabilizing weapon systems. Such reductions can be achieved while at the same time introducing more modern weapons which are safer, more secure, more survivable and more stabilizing. This is the approach we should take in Geneva and I believe it will require continued nuclear testing.

The issues regarding nuclear testing must be addressed head-on with openness, but with caution. The government has undertaken an important approach to this purpose. We have met four times since last July with the Soviets at the Nuclear Test Experts Meetings in Geneva to discuss the broad range of issues relevant to nuclear testing. I myself participated in the first three of those meetings. Currently, we and the Soviets are trying to

develop an agenda for negotiation on nuclear testing. I believe that we can succeed in accomplishing this task.

I would like to submit my statement for the record and also an article which I wrote which elaborates more thoroughly on the issues that I've discussed here today. It appeared in a Livermore Laboratory magazine. And an article which is stapled to the back of my written statement that was written by Dr. Michael M. May, who was the director of Livermore from 1965 to '71. His article is entitled "On the Role of the Weapons Laboratories" and it appeared in the Bulletin of Atomic Scientists in June of 1985. Thank you.

CHAIRPERSON WATSON: Thank you.

Dr. Brown, let me ask that any of you who have written statements, submit them to us so that we can be sure that we have all the information that's been given here for the recorder. Some of you are giving very rapid testimony and it's highly technical and I know our stenographer is having somewhat of a problem keeping up with you.

DR. BROWN: I apologize.

CHAIRPERSON WATSON: Dr. Richard Garwin is with IBM Watson Laboratories.

Dr. Garwin.

DR. GARWIN: Yes, I'm Richard Garwin and I'm testifying here as an individual. My interest and experience in this field comes from my association with the Los Alamos National Laboratory since 1950, where I helped to build the first hydrogen bomb and also had a lot to do with new techniques of testing.

Since then I've been a number of terms on the President's Science Advisory Committee and a consultant to every administration including the current one on such matters.

CHAIRPERSON WATSON: Dr. Garwin, would you pull that microphone closer to you, please.

DR. GARWIN: Yes.

So, let me just say that I believe that we will have to rely on nuclear weapons for a long time, for many decades, and we will need people who understand them and who are motivated to work with them.

That said, though, we do not need nuclear tests to maintain the existing types of nuclear weapons reliable or to adapt them to new delivery means such as the Midgetman missile. Here I disagree with the previous speaker.

I think a total ban on nuclear explosion tests is in our interest and can be adequately verified by cooperative seismic means down to a yield less than one kiloton, some one-twentieth of the yield of the first atomic bombs.

You've not heard one word in this hearing so far as to why we would want a ban on nuclear testing. So, I have to reveal the dirty secret that our purpose in stopping nuclear tests would be to stop the evolution of the Soviet threat, not of our own; to stop the Soviet Union from developing x-ray laser weapons, for instance, and to impede the acquisition of nuclear weapons by other nations.

So, the question is not is stopping nuclear tests in our interest, it is whether it is in our net interests. You

have to look at the benefit side as well as the cost side of the market.

Now, in this, weapons laboratories and their directors have a real conflict of interest, whether they recognize it or not, in advising on a nuclear test ban. In 1978 Harold Agnew, then director of the Los Alamos Laboratory, and Roger Batzel, now director of Livermore, persuaded, according to Dr. Agnew's account, President Carter not to push for a Comprehensive Test Ban treaty. Dr. Agnew takes pride in what he calls the availability of this, quote, "disinterested advice" as a consequence of our system.

The University of California selected a director for the Los Alamos Laboratory following Dr. Agnew who in his tour of Washington did not do his duty in presenting the administration's program in a congressional hearing, but substituted instead the Department of Energy program; an action which earned eventually for him a reprimand. But he was nevertheless chosen to head the Los Alamos Laboratory.

The laboratories are administered by the University of California, but they take their orders and they get their funds from Washington. The University of California administration gives the labs legitimacy. But if this is not done right, the administration will reduce the integrity of the University and of the State of California.

Whether it has been done right or not is not my field of expertise. Doing it right though means to assure that the labs are operated in the national interest, not just in the interest of the Department of Energy. It means

ensuring that all voices are heard, that the materials and the information produced in the laboratories are available to support all options which could be considered by our political leaders.

Now, there are some special questions which are involved and one of them, for instance, is whether nuclear explosion tests are necessary to maintain stockpile reliability. Much has been written on this subject, but in my opinion much of it is misleading.

I think that one cannot accept what Dr. White said in that we have the highest reliability, highest standards of excellence in our nuclear weapons program and still refer to the sorry state of the nuclear stockpile following the introduction of weapons developed during the moratorium.

In my opinion that was irresponsible. Weapons should not be introduced into the stockpile until they have been proof tested in their manufactured version. So, when I talk about continued reliability of stockpiled weapons, I'm talking, of course, about weapons that have had their proof test in the production version.

Those weapons do not need nuclear testing, do not receive nuclear testing to ensure that they will continue to work. If you imagine how many nuclear tests are required by nuclear tests alone to demonstrate 99 percent reliability or even 90 percent reliability for the various weapons that we have in stockpile, it is an enormous number.

You have heard also that the weapons could be remanufactured when non-nuclear inspection shows that they

are deficient and that the cost to the taxpayer would be enormous to remanufacture every five years. Let's see those costs.

I had for a long time an argument with the U.S. Navy beginning in 1972. The Navy would not, no matter how much I urged their presentation in congressional testimony, indicate the costs of continuing the operation of our nuclear submarines beyond the 20 or 25-year design life and they said that we could not do this because of hull corrosion and metal fatigue. Eventually in 1978 I received from the Assistant Secretary of the Navy for Research and Development a letter indicating that we have no problems with hull corrosion and metal fatigue and that they would have no problems.

So, these questions of how much it costs to remanufacture and what the nuclear weapons establishment would look like without nuclear testing have to be addressed by the experts in this field at the laboratories. If there are studies to this effect, I have not seen them.

We have heard that nuclear testing is required so that one can draw on years of experience in nuclear design and tests. These years of experience will not go away, they're not written on the wind. We have recordings and test results. Future weapon designers will have this historical experience as well.

Let me give you one example of the negotiation of weapons characteristics among the Department of Energy, the Congress and the Department of Defense.

In the 1970's there was a new warhead proposed for a

surface-to-air Navy missile. An existing warhead would fit the operating characteristics required, except it was two inches too long to fit into the missile compartment designated for the warhead. The Department of Defense refused to reconfigure the sketch so as to accept the existing warhead and a $200 million weapon development was undertaken simply because of the bureaucratic rigidity. That is not in the interests of our security no matter how much one may like the expenditure of $200 million for a warhead.

The question of insensitive high explosive. We've known about this for a long time. Only 40 percent of our existing weapons have insensitive high explosive. We've had no limitation on nuclear tests so far. If insensitive high explosive incorporation into the stockpile is so important that we cannot accept a test ban limiting Soviet development, why have we not hastened to put it into the stockpile already? Why are we delaying its advent so that it can be entered into a stockpile in the routine evolution of these capabilities?

Finally, when we launch people into space, we do not redesign the people. We package them so they can be sent up and brought down safely for the most part. So it is with the Midgetman missile. The W87 warhead is already tested. It could be adapted to the Midgetman missile. Depending upon the basing mode, the Midgetman would have to require packaging of this warhead to bring its vibration shock temperature surges down to those for which the warhead have been designed.

One might denigrate or perhaps for that matter honor the missile by called it the Congressman missile, but it certainly doesn't help rational discourse about it.

You do not hear on the Midgetman missile the most appropriate way of basing that missile, which is to put it in silos. Why don't you hear it? Because it would be too cheap. It would be too big a competitor under those circumstances putting a single warhead missile with the existing MX warhead in a silo so that it would be self-protecting so that to destroy one warhead on our side would require the expenditure by the Soviet Union of what is generally reckoned as at least two more heads on their side.

The laboratories are not doing their job in my opinion when they do not make studies to show that such a weapon could be obtained soon and at low cost with existing components even if we lost the interest which comes from the development of new technology.

Now, the Soviet bombs, I have no idea whether they will survive without non-nuclear inspection and remanufacture. I think we can count on the Soviet Union to monitor and maintain their own stockpile. I think that we count on our nuclear weapon establishment to do that, also.

The former director of Los Alamos previously maintained -- that is, Harold Agnew -- that he did not need nuclear testing to maintain stockpile reliability, but only a sufficient amount of money for a non-nuclear inspection program and exemption from the Occupational Safety and Health Act.

Eventually, Dr. Agnew changed his public view. But that was not because he changed his technical judgment. It was because he felt that the availability of money for these programs and priority would not be assured without a costly nuclear testing program.

In answer to the question which was given to me, the second question: Apart from bomb-driven beam weapons, do I foresee the day when bomb production will become strictly an industry devoid of the need for innovative design.

There's not much you can do in innovative design if you are not having nuclear tests to verify it. I would object to the introduction into stockpile of a nuclear weapon which had not been tested. But that does not mean that our nuclear weapons will turn into green cheese. If we monitor them, we can keep them reliable, effective nuclear weapons. If we do it right and we choose our weapons carefully -- for instance, the single warhead Midgetman missile in silos -- that and a total ban on nuclear tests can hasten the day when we have vastly fewer nuclear weapons in the world -- maybe a thousand on our side instead of the current 30,000 or so -- and when additional nations will see great barriers to the acquisition of these terribly destructive capabilities.

CHAIRPERSON WATSON: Thank you.

Dr. Ray Kidder, Lawrence Livermore National Laboratories.

DR. KIDDER: My name is Ray Kidder. I'm employed at the Lawrence Livermore Laboratory and I've been there for about 30 years.

My history with the laboratory is that initially I was involved with the design and physics of nuclear weapons and in particular I was used by the laboratory to advise the laboratory as to the operability of the nuclear weapons we acquired -- that is, we meaning Livermore -- acquired in the Operation Dominick in 1962 and report to the then director of the laboratory, John Foster, as to whether the designers had done their homework properly or not and also as to whether any of these weapons that we were going to -- or these devices, as they're called at that stage, we were going to fire would possibly not work or, on the other hand, what was the one that we were going to fire that would have the very greatest probability of working properly, producing a big bang so that we would start the series off that way. That's the kind of a job I had then.

Since that time I've been involved with a number of other programs in the laboratory. But I've kept my hand in the nuclear weapons field. I've advised the laboratories from time to time as to the adequacy of designs of its nuclear weapons and at the present time I'm personally engaged in the design and theory and new ideas for nuclear directed energy weapons, which is the current high priority activity of the Lawrence Livermore Laboratory. So, that's my background.

What I'm going to do is I'm dividing my statement up essentially into two parts, Madam Chairman. The first part which I'm going to give this morning I expect very briefly -- I hope very briefly -- has to do with a request that I

received from a Congressman to evaluate some of the evidence that the Lawrence Livermore Laboratory had presented to the U.S. Congress in late 1985 having to do with the need to continue nuclear weapons testing in order to maintain the stockpile.

I've evaluated the evidence that the Lawrence Livermore Laboratory has submitted -- at least all the evidence that's come to my attention at this time -- and I'm going to talk about that very briefly now. Then this afternoon in the second panel I will try to answer the question: What has all this got to do with the University of California and the State of California?

So, with that introduction and sort of outline of what I'm going to do, let me proceed. All of this will be submitted as part of the record.

The nuclear weapons laboratories have been relying on a recitation of problems that have been encountered over the years with stockpiled nuclear weapons to support their contention that continued nuclear explosive testing is necessary to maintain confidence in the reliability of the existing stockpile of nuclear weapons.

Six examples of such problems were described in an unclassified 1983 study by a Department of Energy contractor entitled "Some Little-Publicized Difficulties with a Nuclear Freeze." This study has received considerable publicity and is commonly referred to as the Rosengren Report, the reason obviously being its author was named Rosengren.

The report was submitted into the record of the

congressional hearing of September 18, 1985 by Nuclear Weapons Laboratory officials from Livermore. So, that's how it got into the Washington record.

At the request then of Congressman Edward J. Markey, Massachusetts, I undertook an evaluation of the Rosengren Report to answer the question he posed to me, which was: Do the examples cited in the Rosengren Report support the thesis that nuclear explosive testing is necessary to maintain confidence in the reliability of the existing U.S. nuclear stockpile of thoroughly tested nuclear weapons?

Now, the reason that that was a question of interest to him is described in the letter that he wrote to me, which is very brief. So, if you don't mind, I'd like to read that, assuming I can locate it. Here it is. This letter is dated May 27, 1986. It's addressed to Dr. Ray Kidder. That's me. He says -- this is Congressman Markey now. He says:

> "Over the past several months, Administration officials have frequently cited an unclassified 1983 study by a Department of Energy contractor to substantiate arguments that a Comprehensive Test Ban Treaty would degrade the reliability of the U.S. nuclear stockpile and the credibility of the U.S. deterrent."

He goes on to say:

> "The study, by Jack W. Rosengren

> of R&D Associates, is titled "Some Little-Publicized Difficulties with a Nuclear Freeze." It argues that judging from past experiences, a ban on the underground testing of nuclear weapons could be expected to severely undercut the capability of the United States to maintain a reliable nuclear weapons stockpile. This study has been submitted into the record of at least three Congressional hearings on the test ban and was the subject of a front page article in the Washington Post."

In other words, I want to emphasize strongly that this particular report by Rosengren was used not by Rosengren, who was merely the contractor that did the work for the DOE, but it was used on a number of occasions by the Department of Energy and by officials from the weapons laboratories for the specific purpose of supporting their contention that nuclear testing would need to be continued to maintain confidence in the stockpile. So, this is not just a report off in left field somewhere.

Now I'm going back to Representative Markey again. He says:

> "While I am not a nuclear weapons expert, my own reading of the

report has lead me to the conclusion that many of the specific examples cited in the report do not substantiate the overall thesis, insomuch as they relate cases in which insufficiently tested warheads were placed into the stockpile (e.g., during the 1958 to 1961 test moratorium) or cases in which substantial changes were made in the design or materials used in a warhead that necessitated an explosive nuclear test. In any event, it is not clear to me that if any of the specific instances cited a nuclear test was needed to identify and correct the stockpile problem that had arisen."

He goes on to conclude:

"I would greatly appreciate it if you could review the R&D Associates report and provide me with your own unclassified analysis of its contents. In particular, I would like to know if your review of previous experiences with stockpile problems demonstrates that nuclear

> explosive testing is necessary to maintain confidence in the reliability of the U.S. nuclear stockpile of existing, thoroughly tested nuclear weapons. Do you believe that there were then and are today alternative means available to identify and correct stockpile problems as they arise?"

Now, Dr. Garwin has just discussed some of the alternative means available to identify these problems, but let me simply go on and tell you what my evaluation was and the results that I communicated then to Congressman Markey.

Now, I must say that he started out by saying he wasn't a nuclear weapons experts, which he's not. My conclusion, having read this letter and having looked at the question that he asked me in some detail, was that he was a very perceptive man indeed. So, let me proceed then to just say a few words about what I found out.

Now, my evaluation of this report, the Rosengren Report, that Markey asked me for is here. I'll leave that with you with the rest of the copy of the statement. I want to read just a very short section of this at the beginning of it so you'll know what it's about and the conclusions. It says:

> "Over the past several months, Administration officials have frequently cited an unclassified

'83 study by a Department of Energy contractor to substantiate arguments that a Comprehensive Test Ban Treaty would degrade the reliability of the U.S. nuclear deterrent. The study, by Jack W. Rosengren of R&D Associates, is entitled 'Some Little-Publicized Difficulties with a Nuclear Freeze.'"

If I'm going too fast, just let me know. When I start reading, I may do that.

"It argues that judging from past experiences, a ban on the underground testing ... could be expected to severely undercut the capability of the U.S. to maintain a reliable nuclear weapons stockpile." And so on.

"In support of the thesis that a ban on nuclear weapons tests would severely undercut our capability to maintain a reliable stockpile, Rosengren cites difficulties experienced with one tactical nuclear weapon and five nuclear warheads after they were placed in

stockpile. They are:

"The W45 tactical nuclear weapon

"The W47 first Polaris missile warhead

"The W52 Sergeant missile warhead

"The W56 Minuteman missile warhead

"The W58 second Polaris missile warhead

"The W68 first Poseidon missile warhead

"The question we address in this evaluation is: ..." And this is important, I think, to be accurate about it. "Do the examples cited in the Rosengren Report support the thesis that nuclear explosive testing is necessary to maintain confidence in the reliability of the existing U.S. nuclear stockpile of thoroughly tested nuclear weapons."

That's the precise language that was used by Congressman Markey in addressing that question to me.

Now I'll simply read the conclusions of this report that I submitted to him.

"We conclude ..." and we meaning just me "... that none of the examples cited in the Rosengren Report support the thesis that nuclear explosive testing is necessary to maintain confidence in the reliability of the existing U.S. nuclear stockpile of thoroughly tested nuclear weapons for the following reasons:

"No nuclear tests were required either to identify or to correct the problems encountered in stockpile with the W56, W58 and W68. None were indeed performed with the W56 or the W58. A successful 'final development' test of the W68 was conducted which the laboratory responsible for certification of the warhead did not require.

"The W45, W47 and W52 were not adequately tested prior to stockpile in the early sixties, largely as a result of the 1958-1961 nuclear test moratorium."

So, that was my response to Markey having to do with the six examples that he asked me to look at.

Now, there were two other examples which came to my attention this time as a result of an inquiry by Frederick Reines, Professor Reines, who is the chairman of the Scientific and Academic Advisory Committee of the University of California. I just want to refer to those two additional examples and then that would finish my statement for this morning.

Two additional examples were presented by Roger Batzel in a classified addendum to his testimony at the September 18th congressional hearing I have referred to earlier. At the request of Professor Frederick Reines, chairman of the Scientific and Academic Advisory Committee of the University of California, I included these two additional examples in my evaluation, bringing to eight the total number of examples considered.

None supported the thesis stated in Congressman Markey's question. No nuclear tests were required either to identify or correct the problems encountered in stockpile with three of these eight examples -- the 56, 58 and 68.

Incomplete testing prior to being stockpiled accounts for the difficulties encountered with the remaining five. Each of these five fall into one of four main ways in which an incomplete testing program has led to unreliable weapons. The four ways are: (a) modifying stockpiled weapons without nuclear proof tests; (b) rushing new weapon designs into the stockpile without thorough testing; (c) failure to test the version of the warhead as it is actually deployed; and (d) failure to test for the effects of the

environment the weapon will experience in the stockpile and in actual use.

Most of the type (a) and (b) problems occurred during the moratorium as new warhead designs were stockpiled after a less than comprehensive testing program. The distribution of the five weapons among these four categories is as follows: The W45 comes under Russian new weapon design; the W47 likewise; the W52 comes under modifying stockpiled weapons without nuclear proof tests; the W80, which has been referred to, I believe, by Paul Brown comes under (d), the failure to test for the effects of environment -- in that case low temperature -- the weapon will experience in the stockpile and actual use; and, finally, the W84 comes under heading (c), failure to test the version of the warhead as it is actually deployed, which was one of the points that was raised by Dr. Garwin.

So that all I want to do then is summarize and say that I believe it's reasonable to assume that the best evidence for the continuation of nuclear testing would normally be the evidence that would be set forth by the weapons laboratories themselves. In other words, since they use these examples to support their allegations as to the necessity for testing, I think it's fair to assume that that's the best evidence that they have.

Now, in eight cases out of eight so far -- and I understand that there are a few more that I haven't seen yet, which I'm sure we'll be asked to look at. In eight out of eight so far the best evidence that the weapons labs have

been able to come up with simply doesn't prove their point, in my view, and I've given you the reasons why that's so.

I'm sorry that this has been somewhat of a technical statement on my part. This afternoon I think I'll get away from that and get down to the University of California more directly and the relationship with the University and the labs and the State of California.

But I wanted, first of all, to lay the groundwork to be sure you understood that people have looked at the evidence and don't agree with the conclusions that the weapons laboratories have come to having to do with the need for continued nuclear weapons testing. Thank you very much.

CHAIRPERSON WATSON: We'll take a moment for the stenographer to change paper. The next person to testify will be Jack Evernden.

DR. EVERNDEN: My name is Jack Evernden. I'm a seismologist. I'm presently employed for the U.S Geological Survey, Menlo Park, California. For obvious -- as we all point out, I'm here today as a private citizen and my views are not necessarily those of the U.S. Geological Survey. But as an American citizen with First Amendment rights, I can speak my peace.

I guess I should make clear my status here so that my testimony will not be misconstrued. I was a professor at the University of California for 12 years, attaining a full professorship status in the Department of Geology and Geophysics. I must admit for those years I joined in the opinion of virtually every other member of the Academic

Senate in not understanding that the University had anything to do whatever with the operation of the labs or why it should. I must admit I have maintained that opinion over recent years.

In 1965 I left the University, resigned in order to go to Washington to work on the seismological aspects of a Comprehensive Test Ban Treaty; because I also admit that from that day to this I have believed it is in the best interests of the United States and the world that we have a Comprehensive Test Ban Treaty.

I do not believe any of my technical results are bias. By that, my opinions. I certainly admit that virtually my entire scientific career has been biased by that commitment, because that's practically all I've done for the last 21 years is do research in this area.

There are a few questions here that Panel I is assigned to answer and I guess I should give answers to those before making some other comments.

The first two questions that bear on seismological matters I'm quite certain would receive the same answer that I'll give from the gentleman to my right here: Do recent recalibrations confirm the early reports of repeated USSR violations of the 150 kiloton threshold test ban treaty? I think both I and David agree they do no such thing. They confirm that the Soviets have not violated the official treaty.

The second one is: Do you conclude from the currently available evidence that the USSR cheated on its

self-imposed, unilateral, 18-month-long nuclear test moratorium? I'm quite certain David would agree the answer is clear and unequivocal the Soviets have not cheated on that moratorium. They have indeed not tested during that timeframe.

From then on the comments get more specific to the issue here. Even though the debate today or the discussion today has appeared to be largely based on whether the U.S. should or should not -- or the arguments for and against a Comprehensive Test Ban Treaty, everything here today is still fundamentally to link the role of the University in its oversight status and from our -- or at least from mine -- has the Unversity performed in that status.

It seems to me from the discussions today between the gentlemen at the two ends of this table that if it is the role of the University or the University conceives its role as that of public interest and that is why it is continuing supervision of the laboratories, it has clearly failed in that study. Because with the variety of dispute which is given here today -- which is not a dispute. It's a dispute which has continued over the years -- it seems to me that any oversight committee should have long since held intense hearing on these issues to try and decide whether the gentlemen immediately to my right or somebody such as Ray Kidder are or are not correct in this issue. These are vital and strong issues and in my mind they have directly to do with the oversight role of the University.

As I say, I don't think the University has ever

performed its oversight role properly and I don't think it's performing it today properly.

Getting to my role here relative to a Comprehensive Test Ban Treaty is my role as a seismologist and do I have comments on whether the laboratories have or have not made, if you will -- have the statements they've made on seismological matters been those strictly controlled by the science of the subject or have they been in some sense, at least in my interpretation, self-serving.

On the issue of the yield threshold treaty, I think all of their statements since 1981 are true. I do so because I've agreed with them since 1971 and both they and I would agree that there is no evidence that the Soviets have violated the yield threshold treaty.

I compliment them -- I really do -- on the forthrightness and directness of those statements over the past few years. They've been against those of the government and they've been against those of some strong people in Washington and the laboratories have voiced what I believe is a correct technical position on that point and have done so in spite of, I don't doubt, pressures from Washington.

On some of the other issues that get more sophisticated relative to a test ban treaty, I must admit I do have questions. Several years ago two gentlemen at the Laboratory came to my office and when I asked them why they were putting their names on a document that they attempted to publish in a science magazine and which I was able to thwart there, but was subsequently published in Nature, these

gentlemen, who had nothing to do with the research that went into that paper, asserted that they were forced to put their names on that document.

That document was intended to document the reality of a certain mode of evading seismological capabilities under a test ban treaty. At the time of publication of that document we had already circulated a solution to that supposed technical problem. It was a concept of multiple explosions. The entire concept of multiple explosions has since been abandoned because it is easy to detect the fact of multiple explosions and know that it is a multiple explosion, not a single explosion and most certainly not an earthquake.

There are a couple of other more recent examples. I really don't think there's any point in going into the details. I will if you wish. But they, again, are ones which, in my opinion, are not forthright statements of the scientific status of seismology. They tend to raise objections which I think are technically invalid, have been demonstrated to be invalid in the literature.

So, I must say that I do not feel that the labs have in truth been completely forthcoming on these matters. I mean, I suspect that some of them feel over the years that I, Jack Evernden, have had my emotional biases toward a Comprehensive Test Ban Treaty get in the way of my technical judgment. I don't believe so. Everything I've ever done on this subject has gone through extensive peer review by American scientists and has been published after that peer review.

So, on the other side, I'm not sure that they always are statements or ones which appear to make the negotiation of a test ban treaty impossible. I find it hard to believe that always they would come up that way.

I personally have not. I have published things in the scientific literature which have raised serious objections to the negotiability of a Comprehensive Test Ban Treaty. I've got to admit that in subsequent years I've kept on working and have now eliminated those objections.

But one of the first and large objections that has been raised was the possibility of hiding an explosion signal in that of a large earthquake. I think I can fairly say that the first discussion of that in detail in the scientific literature was in an article by myself and that nobody else has ever discussed it in detail. It was true, it is real and it was a profound problem up until the time we figured out the solution. We now have the solution. That solution has also been published in the open literature.

I must admit I have the greatest respect for the people who work at the Livermore Laboratories. I certainly have some differences of opinion with them. Thank you very much.

CHAIRPERSON WATSON: Thank you for your testimony.

Now I would like to call upon the final member of Panel I, Dr. Herbert York, Director of the Institute on Global Conflict and Cooperation at UC San Diego.

Dr. York.

DR. YORK: Thank you, Senator. Most of the

discussion this morning has been on technical issues. I'd like to turn to some of the policy issues and political issues that are involved here. These, of necessity, are informed by technical questions; but they're not totally determined by such factors. There are a great many other things that enter in as well.

Also, the reason that I'm here this morning is I'm a University witness. But it's not connected with my current University activity, it's connected with the fact that long ago I was the director of the Livermore Laboratory and much more recently and I think more importantly for this morning I worked with the Carter administration in the White House, the Pentagon and the State Department all during the Carter administration on a variety of issues mainly having to do with arms control and I was President Carter's chief negotiator on the Comprehensive Test Ban for the last two years of the Carter administration. So, I had an opportunity to see the interplay of all kinds of factors at the political level and in the way that they determine the course of events.

Basically, the basic facts that may not be appreciated are that there never was a consensus in the Carter administration in favor of a test ban. The President himself was in favor of a test ban, but there never was a consensus to that effect. In fact, there was a great deal of opposition.

The Department of Energy, which operates the laboratories and is responsible for the nuclear weapon

stockpile at the federal level, was almost universally opposed to a test ban. The Secretary of Energy was James Schlesinger. He was flatly opposed to a test ban. The Acting Assistant Secretary for National Security Affairs, who has already been mentioned, was Donald Kerr. He was flatly opposed to test ban, testified to that effect before the House Armed Services Committee; the majority of which were also opposed to a test ban and encouraged his testimony, including the democratic chairman of that committee.

At lower levels it was the same thing. I remember one of the real crusaders against a test ban was a staffer named Julio Torres, who made it his mission to make sure that somehow it didn't happen.

In the Department of Defense the uniformed military, especially those parts concerned with nuclear matters, were uniformly opposed to a test ban. The Joint Chiefs of Staff studied the problem and concluded unanimously that they were opposed to a test ban.

The director of the Defense Nuclear Agency, an Admiral Robert Monroe, again was absolutely dedicated to opposition to a test ban and from my perspective practically did nothing else except to work within the administration to make sure that it didn't happen.

In the White House itself the picture was somewhat better, but not totally different. The President's science advisor was in favor of a test ban. That was Frank Press. He organized a committee to study the question, which included myself and several others here and also the

laboratory directors.

The President's National Security Advisor, Dr. Ruginski, did not support a test ban and neither did a number of other persons working in the White House in the National Security Council staff.

So, there was very large-spread opposition to a test ban. There were people who were just dedicated to making sure that it didn't happen. They were opposed to it for fairly general reasons. They believed that -- there were really three. One was that modernization was necessary, especially as long as we're depending on nuclear tests; that despite all the work that had been done on seismology, the question of whether or not the Soviets could cheat was not resolved to their satisfaction; and they also did not believe that a nuclear test ban really contributed to the ultimate goal of maintaining peace and security.

I mentioned that Secretary Schlesinger was one of those who was most adamently opposed. As part of his campaign to try and persuade the President to his views, he arranged for a meeting of the laboratory directors. That's been mentioned here this morning and it's been mentioned almost every time there's a hearing in the state of California on this subject.

I wasn't there, but the laboratory directors to my knowledge gave a straightforward statement to the President concerning their views with respect to the impact of a test ban on the laboratories and on their activities.

Harold Agnew was the director of Los Alamos at that

time and he was one of the people who attended. He has said that the President, as a result of that meeting, turned around on the issue and withdrew the treaty. That's absolutely false. It's simply a case of faulty memory on the part of Harold Agnew. However, it's much quoted. It's too bad it's much quoted. It has become part of the record, but it's simply not true that that was the result of that meeting.

There was a result of all of this opposition including the particular meeting with the laboratory directors. As a result of all of this, the President did make at that time two changes in his policy with respect to the test ban. One of them was to abandon his original purpose, which was to have a permanent test ban, and instead go to a policy of promoting a temporary test ban.

That did not by itself interfere with the negotiations. Because that in fact was the original Russian position in the first place and, therefore, the President, while in effect he was motivated to do that because of this internal opposition, he was also in effect simply adopting the initial Soviet view on that matter.

The other effect was that he came to realize what he hadn't realized earlier, that there was much more opposition on this than he had realized; that of all the mainstream arms control proposals that he was dealing with, this alone and singularly had strong opposition.

He then concluded that if a test ban treaty came before the Senate before the Salt II treaty could come before

the Senate, that the political situation that would grow out of all this opposition would make it likely that he would lose everything. So, the President concluded that he had to proceed on all of these various arms control efforts that he was pursuing in such a way as to make sure that the test ban did not come in ahead of Salt, on which he placed a higher priority, I believe quite correctly.

The question of exactly why the test ban negotiations failed has been analyzed by many people. I happened to bring with me one particular paper that I might wish to have for the record, which is the only post-mortem I'm aware of prepared by the Soviets on this question. It's part of a book written by Roland Timerbaev, who was the deputy chief negotiator for the Soviets. He says that the principal problem was the issue of verification. He says that was a smoke screen. The Americans really simply wanted to continue testing, but they used the verification issue as a smoke screen.

Within the verification issue he says the number one block, the principal bar, wasn't what he calls the American-British proposal to put one seismic station on British territory. That was a British proposal, not an American proposal. The way international politics worked, our public position was to support the British; but our private position with the British was that that was wrong and they needed to change.

So, it was a British proposal. It originated in the Ministry of Defense. It was used by Margaret Thatcher, Prime

Minister Thatcher, who also was adamantly opposed to a test ban, as her easiest and most ready means for fighting the test ban.

I mention that particular detail only to emphasize the point that there was very widespread opposition. The laboratories were among those who were opposed, but their role by no means determined the course of events. The course of events was determined much more importantly by a whole string of other factors, including the opposition of the British; who were the third members of this particular negotiation.

So, in summary then, the laboratories did testify before the President and others in a fashion which ended up -- the thrust of their testimony was in opposition to a test ban, but that had very little to do with how things actually turned out despite the fact that Harold Agnew has repeatedly said that it was decisive.

CHAIRPERSON WATSON: We thank you for your input, all the members of the first panel.

We would like now to ask Committee members for questions or comments.

Senator Campbell.

SENATOR CAMPBELL: Madam Chairwoman, I think, first of all, I should stipulate that each of us agrees that nuclear weapons are a horrible massive means of destruction and that nuclear war would be catastrophic for all of mankind and that every reasonable step should be taken to prevent nuclear war or the occurrence of that war. I think we have

somewhat a difference between people as to how to achieve the lessening of potential nuclear conflict that might occur.

There are two questions, I think, that we come down to. Should the University play a role in the management of the labs, I gather, is one of the questions. I think we have a secondary issue that deals with the whole issue of nuclear testing. I think should the University have a role in the running of the labs is -- I think we have a second question that has to come. If the University doesn't manage the labs, who's going to manage the labs?

Obviously, they're not going to go out of existence. The Department of Energy has too much money to allow them to go out of existense. So, they're going to be taken over by government or in some way they're going to be sold off to the private sector.

I think that would be harmful to our opportunity to achieve objectivity in scientific research. I think the University plays a key role in allowing, insofar as possible, the ability of scientific research to take place without being totally dominated by an opinion coming from Washington D. C.

I think one of the doctors just testified about the disagreement, I think, that at least Livermore -- I'm not sure about Los Alamos -- has on the verification of whether or not testing was being done by the Soviet Union which I think probably ran in contrary to what DOE and the Defense Department wanted to hear. But, nevertheless, they were capable of doing that.

I think it's in the best interests of a free society to have that kind of diversity that the University allows. Even though it might not be as much as some people would like, it's certainly a lot better than you're going to get when you look at the alternatives, which seem to be only two-fold.

The issue of the test ban treaty raises a couple of questions, if I can ask a couple of the witnesses. As I understand the testimony, one side believes that nuclear testing is necessary to really determine whether, number one, the instrument is safe and whether you can control the fallout from an accident as relates to those. Apparently there's some sort of deterioration of the stockpile or something of that nature.

Let me first stipulate that I'm not an expert in this particular area. I don't think any of us is an expert in this particular area, but that's the question.

Then those on the other side say, no, you can do it without nuclear testing. You can formulate some sort of plans and use this wonderful computer and you can get all the answers through that. I guess that's the term "proof test". Somebody used proof test down here, somebody along here. I'm not sure exactly who. Is that the term, meaning you can do it without actually exploding the weapon you can get the information? I think that was the term.

So, for just further clarification. Dr. Brown, I think you were the one that talked about the rationale for nuclear testing.

DR. BROWN: Right.

SENATOR CAMPBELL: Would you quickly -- one other question. What's a destabilizing weapon? Is that the deteriortion you referred to?

DR. BROWN: What I mean by a destabilizing weapon is one that is perceived by the other side as particularly threatening because they fear it might be used in a particular crisis in response to a perceived threat. So, it would be used before it was launched.

A weapon in this category in my mind is the MX missile, which to date we have not been able to find a successful survivable basing option for; the MX. And I'm speaking from my own personal view in this regard, not from my laboratory.

We are studying right now at Livermore the potential basing options for all land-based missiles. We are looking at new proposed basing options for the MX, the so-called railroad basing option. We haven't concluded our studies yet.

I look at a weapon system like the Midgetman as providing a stabilizing influence in terms of crisis because it's survivable; it, I believe, can ride out a first strike attack. Because of that, it's going to be much less perceived by the other side as apt to be used in time of crisis.

SENATOR CAMPBELL: Who was the Midgetman?

DR. BROWN: That's the small ICBM --

SENATOR CAMPBELL: That's the one you referred to --

DR. BROWN: That's the one I referred to earlier. It's a small intercontinental ballistic missile and it has been called the Midgetman by most people.

SENATOR CAMPBELL: You say Congress has been pushing for it?

DR. BROWN: Congress has been -- some people in Congress --

SENATOR CAMPBELL: No relation between Congress and Midget.

DR. BROWN: No, I was being very facetious when I made that comment before. There are a number of people -- Senator Gore and people within the House, Les Aspen -- who have been advocating development of this system. Some have said, gee, with a system like this you're essentially achieving arms control, because you're introducing survivability. I hope that answers your question with respect --

SENATOR CAMPEL: That was destablization. I want to go now to the testing.

DR. BROWN: Why nuclear testing.

SENATOR CAMPBELL: Right.

DR. BROWN: We have to look back at -- I mentioned four reasons for testing. One of them was reliability. I believe we have to look at history to see where the problems occurred in the past and learn from them to determine where we have had experiences.

SENATOR CAMPBELL: You said during the test ban between '58 to '61.

DR. BROWN: There were some examples back then and some examples that Dr. Kidder alluded to and there was one weapon system in particular that I'll address. It was a warhead called the W52, which was something that was put into the stockpile prior to the moratorium and we thought it had been thoroughly tested and we did it as thoroughly as we -- this was done by Los Alamos. They did it as thoroughly as they thought. However, during the moratorium a situation arose where a significant safety problem came up.

Scientists working at Los Alamos with the high explosive that's used in the trigger of this weapon experienced two accidents in which four people were killed. It was judged at the time that the high explosive in this warhead was just too sensitive and too dangerous to be allowed to be exposed to the troops who have to maintain it.

So, the decision was made during the moratorium to replace the high explosive in that warhead with one that was considered safe and it was done on the basis of non-nuclear experiments and calculations.

SENATOR CAMPBELL: That's your insensitive high explosive.

DR. BROWN: No, this was not insensitive high explosive. This is something that came along years later. They put it in with a high explosive which was less sensitive than the first material. When it was tested after the moratorium was over, it was a failure. It didn't work. It was judged at the time that it was okay. I think Dr. White, who comes from Los Alamos, may want to elaborate on this one

particular point.

DR. YORK: May I comment on it?

CHAIRPERSON WATSON: Very quickly and then I want to call on Assemblyman Hayden and Assemblyman Bates.

DR. YORK: This issue of stockpile reliability is one of the things the laboratories give for testing and it has much exercise to technical people. But it was completely resolved that it's not necessary for stockpile reliability, it would not change the political situation at the present time. That is, the current administration's opposition to a test ban is not based on this and Jimmy Carter's decision in favor of a test ban was also not based on the conclusions of this argument.

So, it's an important factor; but it's not a decisive factor, no matter how it comes up.

CHAIRPERSON WATSON: Are you finished, Senator Campbell?

SENATOR CAMPBELL: No, not through yet.

What's your other reasons for --

DR. BROWN: The other reason for -- and Dr. York is right. It's only one reason of many, reliability. The other reasons are that we are modernizing the stockpile for improvements in safety, security and survivability.

SENATOR CAMPBELL: Does the stockpile deteriorate? I mean, do the weapons deteriorate?

DR. BROWN: The weapons are made of chemically interactive materials and they do deteriorate. Sometimes the deterioration becomes unacceptable. We monitor it with

non-nuclear means which have fixed problems and we've fixed most problems over the years.

SENATOR CAMPBELL: We have about, what, 8,000 warheads?

DR. BROWN: I can't say what the exact number is, but it's of the order of thousands.

SENATOR CAMPBELL: What are the other reasons?

DR. BROWN: The other reasons are to determine the effects of vulnerability of warheads that are being developed that are in the stockpile to weapons effects, particularly nuclear weapons effects.

SENATOR CAMPBELL: Can you tell whether the guidance system of a radar will work when you have a nuclear explosion?

DR. BROWN: This is one of the reasons for doing testing.

SENATOR CAMPBELL: Do you do that through a proof test?

DR. BROWN: This is done by the Defense Nuclear Agency in a test at the Nevada test site where they expose electronic equipment, part of the communications warning system and so on.

SENATOR CAMPBELL: Is all of the testing now done underground?

DR. BROWN: All is done underground. We have to do it underground.

SENATOR CAMPBELL: Do the Soviets do any above ground prior to the test ban?

DR. BROWN: Not to my knowledge they have not. Everything's been underground.

SENATOR CAMPBELL: What is the x-ray laser?

DR. BROWN: The x-ray laser is a directed energy weapons system that is having research done on it by Lawrence Livermore Laboratory. It's very much like an optical laser. It's pumped by a nuclear weapon instead of by a flash lens and it uses light in a different part of the spectrum. It happens to be in the x-ray part of the electromagnetic spectrum rather than the visible part.

SENATOR CAMPBELL: Are the Soviets doing research in x-ray lasers?

DR. BROWN: We don't know for sure what they're doing. They've published in the open literature on x-ray lasers. That much we do know. Whether they're doing experimental work or what they are doing beyond what we've seen in the open literature is anybody's guess.

We believe they have the basic capability and scientific understanding to make progress in this area, as we believe we can make progress in this area. But they do have the capabilities to do so. Whether they're doing it or not, we don't know.

CHAIRPERSON WATSON: Assemblyman Hayden.

ASSEMBLYMAN HAYDEN: Madam Chairman, thank you deeply for this hearing and I express regret I can't be here all this afternoon. But I would like to ask a couple of questions, if I may.

CHAIRPERSON WATSON: Please do.

ASSEMBLYMAN HAYDEN: There may be ways to follow-up some of these issues in the Assembly Subcommittee on Higher Education Policies that I chair and I would be glad to work with you on that.

Going back to Mr. Frazer. If I understood your statement, sir, it was that the University justifies its role in this regard as a matter of public service and not budget.

DR. FRAZER: Yes.

ASSEMBLYMAN HAYDEN: It's not budget driven.

DR. FRAZER: No.

ASSEMBLYMAN HAYDEN: You said you lose money.

DR. FRAZER: No.

ASSEMBLYMAN HAYDEN: Would you clarify what the budget side of it is and how the University comes away with neutral yield or a wash?

DR. FRAZER: Yes. It's a matter of being reimbursed. A negotiated reimbursement for expenses incurred. The basis of the management fee is negotiated, as is overhead on any federal contract and grant.

The negotiation takes place between Department of Energy officials and -- well, government officials. I'm not sure which -- and people at the University just to try to arrive at a fair settlement; compensation for some of the people we employ who are solely engaged in laboratory matters, compensation for a portion of my time devoted to this and so forth and so on.

The total management fee is only a little over $7 million on a budget of almost two billion. So, you see,

it's a rather modest fee and in fact quite deliberately. The University is not desirous of becoming financially dependent on a fee for this service.

ASSEMBLYMAN HAYDEN: Others I'm sure will testify on this later. I just wanted to clarify your position.

Now, again, what is the public service function that is involved here in the University's definition?

DR. FRAZER: In what way do we think we're performing a public service? Is that what you're asking?

ASSEMBLYMAN HAYDEN: Yes, if you could just clarify.

DR. FRAZER: In, I'd say, two principal matters. In our oversight of the laboratories we attempt to maintain a very high level of technical personnel. It's generally believed -- although you could not proof this -- that the University's connection is in fact useful to the laboratories in recruiting top personnel. It is a fact, I think, that you can verify that the quality of research at those two laboratories is far and away superior to the quality of research at government laboratories in general.

The second matter and one in which I think the University uniquely has something to offer -- that is, I'm not saying that another enterprise couldn't manage a highly effective laboratory. Bell Laboratories, of course, is a prime example of an excellent industrial laboratory.

The second aspect which I think we are in a unique position to carry out is to try to provide, let me say, a quasi-academic atmosphere for the laboratories; an atmosphere in which the scientists of the laboratories are as free to

engage in scientific exchange, discourse, argument back and forth the way scientists do as free as possible within the constraints of security.

ASSEMBLYMAN HAYDEN: What are those constraints that -- what's the difference between an academic atmosphere and a quasi-academic atmosphere?

DR. FRAZER: That's why I say quasi. Because on our campuses we've not had classified research.

ASSEMBLYMAN HAYDEN: What's the limit that makes you say quasi?

DR. FRAZER: Oh, it's just that one. As I say, it is not an academic atmosphere. If you go to Livermore or Los Alamos or anything --

ASSEMBLYMAN HAYDEN: It's sort of an academic.

DR. FRAZER: -- you have to have a security clearance to discuss many of these issues.

ASSEMBLYMAN HAYDEN: How does the University officially reconcile the first amendment freedoms that are associated with the University with this secrecy in terms of the public interest, public mission, public interest mission?

Is that just an uncomfortable paradox the Regents have decided to live with? How is it spelled out in policy? How do you censor people in the structure in an otherwise free university?

DR. FRAZER: Let's me say, first of all, that -- and repeat -- that on a university campus we do not permit classified research. It does not square well. It does not sit well with the open teaching function, the free exchange

of information.

Now, the laboratories are not campuses. The classification, the secrecy of the laboratory is, of course, not imposed by the University. It's public policy. I'm not even personally sure that it's a wise public policy. It's been questioned at times by many scientists whether the level of secrecy, security restrictions, is appropriate. But it's imposed public policy by our leaders in Washington, our legislators and our Executive Branch.

ASSEMBLYMAN HAYDEN: For purposes of policy do you regard the lab as part of the University?

DR. FRAZER: Yes.

ASSEMBLYMAN HAYDEN: But they're not campuses.

DR. FRAZER: No, there are many other --

ASSEMBLYMAN HAYDEN: You started to say that oversight was a function.

DR. FRAZER: Yes.

ASSEMBLYMAN HAYDEN: If the University performs oversight, how can it perform oversight as a university over entities that are not campuses and where classification and secrecy is needed in the involvement of personnel? At that point is the University a university or does the University change hats and become something else? Or is the Defense Department using the University as a cloak for what is really a Defense Department operation?

I don't understand the way the University defines its various roles here. A lot of us -- I think Mr. Bates included -- have been critical of the University being

involved in this relationship. But if the relationship continues at the decision of the Regents, then the question becomes should the University be part of a nuclear weapons lobbying function and, if not, how do you neutralize the lobby? How do you exert oversight sufficient that all points of view are heard and is politically neutered and is no longer a lobbying complex for one view or another of arms control.

CHAIRPERSON WATSON: Dr. Frazer, as you address those questions, also let me allude to something that Professor York said. He mentioned that he was director at one time of the laboratory --

Which one was that?

DR. YORK: Livermore.

CHAIRPERSON WATSON: Livermore. And that at that time, if I am correct, the laboratory people did go and testify that there should not be a nuclear test ban.

Now, if the laboratory comes under the monitoring of the University, I would like to know about the relationship between the people in the laboratory and the University and the fact that it was clearly stated that the laboratory was advocating resistance to a nuclear test ban. Can you explain that relationship?

DR. FRAZER: There is such a complex of questions here. I'll try.

CHAIRPERSON WATSON: Do the best you can. I'm sorry to burden you down.

DR. FRAZER: No, that's all right. I planned in the

third panel this afternoon to get into the mechanisms of oversight that we use. So, to a certain extent I will be getting ahead of myself. I'll try to be brief and I'll see how much you want me to say now and how much you want me to say later.

First, let me --- I guess I'll go in reverse order and answer your very specific question there. It's closely related to one that Assemblyman Hayden asked. What is the University's proper oversight role with respect to ascertaining that the laboratories are giving sound technical advice and not going inappropriately beyond the bounds of giving technical advice and, as you say, lobbying for nuclear weapons. I think that's a perfectly valid question to ask.

ASSEMBLYMAN HAYDEN: Also, if you could, sir, in this answer please also address the other question that the Chair made in the opening remarks about the University's policy on environmental impact reports.

DR. FRAZER: Okay. Let me try to get one part of the question at a time.

Dr. York in fact addressed an occasion on which the two laboratory directors -- he was not director of a laboratory at that time. He was in fact involved in the test ban negotiations himself. The manner in which those two laboratory directors testified about the desirability of a Comprehensive Test Ban.

It's perfectly appropriate -- in fact, it's the obligation of those laboratory directors -- to assess for the President and for the Congress to the best of their ability

the technical problems that there would be in a test ban.

Now, the view they come up with may not be one that in balance agrees with what everyone around the table feels; but they have an obligation to do their very best to give sound technical advice. And I say this word technical.

They do not make public policy and they should not and it's my belief in general they refrain from exerting an undue influence on policy issues. They give independent technical advice.

Now, I think it is indeed a proper obligation for the University to review, to monitor. In fact, it's my task to assure the president of the University that the laboratories are being responsible in the way they carry out this function of supplying technical advice. In fact, it is currently a charge to the Scientific and Academic Advisory Committee, which is one of the key bodies and, Assemblyman Hayden, this will get to part of your question.

We have a committee of partly University faculty, partly faculty from other universities, some technical experts from outside the University. A very highly competent committee to which I refer questions such as this. That's the committee that was referred to chaired by Professor Reines. Professor York is also a member of that committee.

I have in fact referred this question to that committee of evaluating the laboratories' policies and actions with respect to nuclear weapons testing and that study is in progress.

CHAIRPERSON WATSON: Let me just try to for the

record -- and all of these proceedings are being recorded, so I can always check back into it later. But I thought I heard Professor York say that while director at the laboratory, it was his position that we should not seek a ban against nuclear testing. He spent quite a bit of time discussing the political ramifications.

DR. FRAZER: Herb, maybe you want to clarify that.

DR. YORK: I was talking about the episode which is much discussed in which the two laboratory directors met with President Carter at his invitation. I don't think you can call that lobbying. If the President invites you in to talk about something, you're obligated to talk about it; whether you're a laboratory director or not.

But those events took place in the Carter administration. I was not the director of the laboratory at that time. I was working in the White House and the Pentagon and the State Department on arms control issues. But I was working for the government, not for the laboratories.

CHAIRPERSON WATSON: Was it your statement that the laboratories supported the opposition against nuclear test ban?

DR. YORK: The burden of the laboratories' statement to the President was that a test ban would be harmful from their perspective.

CHAIRPERSON WATSON: I just wanted to be sure. I'm a bit confused. Because I guess the laboratories have to be an advocate. So, you're not exactly neutral. Because if a question comes up would it be harmful, you have to say yes

and thus show some advocacy for the position against the test ban.

I just want to be clear as to the position of what's being said here. That's what I'll try to do is facilitate so we'll have some clarity.

DR. FRAZER: I think I can clarify that. There's a difference between simply saying whether you advocate a test ban or not. The function of the laboratories is to provide analysis of what would be the effect of a test ban on the country's nuclear deterrent. It's a technical evaluation they should supply. I believe that differs from advocacy.

CHAIRPERSON WATSON: I believe Assemblyman Hayden had some additional questions and I'll try to keep still so you can answer his questions.

ASSEMBLYMAN HAYDEN: I don't find it very easy to draw the line between opposing a treaty on technical grounds and opposing it on policy grounds. I'm sure that there's a factor of human judgment in there. I would hope so.

DR. FRAZER: But let me clarify what I mean by that. The government would have to take into account or policymakers would have to take into account a whole spectrum of considerations on whether a Comprehensive Test Ban Treaty is in the national interest. The technical issues I refer to are only one component of that decision and it's that component and that component only on which they seek advice from the laboratory directors.

ASSEMBLYMAN HAYDEN: My question was why the University and the public taxpayers of the State of

California should be subsidizing this advocacy in any way and how it's possible to even begin to reconcile it with freedom of speech and the openness that normally surrounds the University.

I do not understand your answer. I believe you said that you've booted that question to a select committee.

DR. FRAZER: No, no. There's a third panel this afternoon in which I will get into that in more detail. I'd be happy to discuss it more right now since you aren't able to be here this afternoon.

ASSEMBLYMAN HAYDEN: Yes, if you could just say what that is and also what is the University's position on environmental impact statements regarding the labs.

DR. FRAZER: Okay. The first -- I just want to correct one misapprehension. The taxpayers of California are not through the University subsidizing the laboratories. We're reimbursed by the --

ASSEMBLYMAN HAYDEN: They're subsidizing the University.

DR. FRAZER: Oh, in general.

ASSEMBLYMAN HAYDEN: Right. Under the cloak of the University or the mantle of the University people are advocating positions in the White House against treaties.

Now, that should be a taxpayer concern. We are subsidizing the mantle, the framework, the legitimacy under which the labs operate.

If you took me to mean that we're paying for the labs, well we do that through our federal taxes. But I was

only speaking of the state portion of it.

DR. FRAZER: Well, I believe that the University's perception of performing a public service in managing the laboratories is, indeed, not one for us to judge. If those who are making the decisions about who should be the contractor for Los Alamos and Livermore perceives that the University is not performing a public service, I'm sure that the Regents will draw from this.

For more than 40 years every President and every Congress has, when they considered the issue, come to the conclusion that that arrangement was in the public interest. We are available to continue this service. We don't seek it.

ASSEMBLYMAN HAYDEN: On the environmental impact --

DR. FRAZER: Oh, yes. There is currently -- well, it's a complicated issue and I don't have all the technical -- I didn't come totally technically prepared on that.

But let me say that this is an issue in which to some degree the University is in the middle. The federal government has environmental impact standards and the laboratories comply with the federal government's environmental impact standards. There's also a question to be raised of the appropriateness, necessity, of the laboratories to comply with California environmental impact standards.

We accept that. But there is a tugging and pulling between state and federal interests here in which I say we're a bit caught in the middle.

CHAIRPERSON WATSON: I'm a bit confused with some of your responses. Because as I look back at the former presenters -- in particular, Dr. Brown -- it was very clear to me that the UC system has advocated the opposition to a ban on nuclear testing or has advocated nuclear testing.

It seems to me from the testimony -- and I'm glad we're recording it -- that there is a very distinct and clear position coming from the UC employees that testing must go forward.

So, I mean, I'm not judging whether that's good or bad. I just don't think that it's correct to say you're neutral. Because what I heard from the witnesses from the UC there's no neutrality.

DR. FRAZER: I'm sorry, I did not mean to use -- I didn't use the word neutrality. I was simply stating that I believe that the proper function of the laboratories and I believe the function which they carry out is to give technical advice on the consequences of a test ban treaty.

Now, that technical advice has, according to Dr. Brown and Dr. White, been such as to point out risks to our nuclear weapons programs if we were to have a Comprehensive Test Ban Treaty. In other words -- and correct me, gentlemen, if I'm saying something that differs from you -- they have advised the government that from the point of view of their program as they are mandated by Congress, a test ban treaty would have an adverse impact upon it.

So, I hope that's clear what I'm trying to say.

CHAIRPERSON WATSON: Just for the record I just want

to state or restate what Dr. Brown said. He said, "I disagree that testing accelerates the arms race. Test limitations could result in political cost as well as ..."

These are pretty strong statements in support. So, I don't think your role goes just to the technical advice. It goes to personal opinion and political advice as well from what I hear from the people testifying as employees of the UC system. These are quotes that we've been taking down as we listen.

DR. FRAZER: Yes, but Dr. Brown is a person with personal opinions, also. Dr. Brown is getting into some policy issues here and giving you his opinion on them. I think maybe I should let Dr. Brown get a word in.

DR. BROWN: I also said in my testimony that there are political advantages to test limitations, that it's our job at the laboratories to state what the technical costs are and it's up to the federal government to weigh the costs and advantages and to make decisions in this area and set policy.

CHAIRPERSON WATSON: Well, you know, there's a fine line here and we're not all marching down that fine line. We're crossing over for personal reasons and University reasons and so on. We cross back and forth over that line. So, I want to point that out.

CHAIRPERSON WATSON: Assemblyman Bates.

SENATOR CAMPBELL: Yes, thank you. I hope I will be able to attend this afternoon. So, some of the questions about the UC role and the relationship of the labs, I hope we'll get into it at that time, too. But let me just make

two observations.

First of all, I believe that any organization, be it the University of California, who are building nuclear weapons, or be it the Soviets, as their counterpart, who are building nuclear weapons and designing those weapons, inherently are going to impose any kind of test ban treaty -- excuse me, not treaty; but any kind of test ban on their ability to test the weapons. I think inherently those people who are manufacturing the weapons, making them are going to want to test them.

(Thereupon a short discussion was held off the record.)

ASSEMBLYMAN BATES: So, it doesn't surprise me that the labs would in fact take that position.

The other thing is that when the Department of Defense or the Department of Energy is paying for the research, they basically are calling the tune and they're telling us in fact the research they want and they're basically purchasing that research from our labs. That's my belief. And academic freedom and all the rest goes only within the restraints of their ability to perform under those contracts.

When you have those contracts, it seems to me you're driven to try to perform so that you get more money and inherently in that comes the conflict. When you're asking to give your opinions, I don't care who -- like today people expressed, well, these are my personal opinions and not the opinion of the lab. When the lab's opinion is expressed, I

think that inherently the machine drives itself toward more funding and more research and more exotic weaponry and all the rest.

I personally feel that the University role in this is one in which the Defense Department is basically exploiting for the reasons that the University says they're involved. The University says they're involved because they add a certain amount of prestige. I think that's unfortunate that the University's prestige is in fact being used in this kind of way.

They also say that they're involved because they can provide a certain amount of technical personnel. I think that's unfortunate, too, that those are the reasons why this makes this a better lab than another. It seems to me that's a dichotomy with the University's role of a free and open society to provide research that would lead toward peace rather than research that would lead toward destruction of humanity.

So, my position is rather clear on the issue. But what I'd like to inquire about is information that relates to the testimony this morning.

First of all, I'd like to ask the person who works for the -- excuse me, Jack Evernden -- about whether in his opinion today it is possible to have a test ban treaty that in fact we would know when either side violated the treaty. Is it your opinion that we could enact a test ban treaty that would be verifiable?

DR. EVERNDEN: Yes. You set the threshold. If you

want verifiable, I'll tell you the seismic network that's required to do it.

ASSEMBLYMAN BATES: So, it's totally possible to verify it, you're saying.

DR. EVERNDEN: Yes, with the appropriate network. I just want to make clear that this requires -- at a low threshold this requires a network inside the Soviet Union. But our experience with the Soviet Union is they'll accept this level.

ASSEMBLYMAN BATES: The next question I had -- did I hear testimony, I thought, we had 30,000 warheads? Was that mentioned by --

DR. GARWIN: About 30,000 nuclear weapons, about 11,000 strategic warheads, give or take a few thousand.

ASSEMBLYMAN BATES: Give or take a few thousand.

I also heard that someone indicated in their testimony that roughly if we got down to a level of about a thousand warheads, that that would be sufficient in terms of our ability to respond to any kind -- or would be a sufficient deterrent to any kind of attack that might in fact occur on our country.

DR. GARWIN: I think there's general agreement that if our warheads are survivable and if there's no defense against them, then that number would be adequate.

ASSEMBLYMAN BATES: Then the question is: Do we have sufficient nuclear warheads right now in stockpile to be able to have that 1,000 for us without having to look for new, more exotic kinds of warheads? Do we have sufficient

capacity?

DR. GARWIN: In my opinion we have sufficient types of warheads. We might have to manufacture more of a particular kind. We have plenty of material for doing that.

ASSEMBLYMAN BATES: Are those adequately tested so that we know they're reliable and they will --

DR. GARWIN: Yes, the ones that I'm talking about are adequately tested and can be maintained reliable without nuclear testing. That was a lot of the discussion that went on before.

Let me just say that when I talked about a proof test, I meant a real underground nuclear explosion.

SENATOR CAMPBELL: Thank you.

DR. GARWIN: Yes.

ASSEMBLYMAN BATES: So, what you're saying then is we have sufficient knowledge right now and we have sufficient technology to manufacture roughly a thousand some odd warheads that would be sufficient to protect us and be a sufficient deterrent against an attack and would be survivable and would protect our country?

DR. GARWIN: That assumes that the Soviet Union is not impelled and not allowed to build vastly more warheads than we would have. I'm not advocating 1,000 on our side, 20,000 on their side.

ASSEMBLYMAN BATES: But it's indicated that in fact we can verify that. In fact, if we could reach some agreement so that we could reduce our numbers down to 1,000, that we in fact have the capability now of producing

sufficient warheads that would be reliable enough to protect our country.

So, it seems to me that, given the information here that we've heard this morning, that it is possible for our country to embark upon a realistic test ban and, I think most people here would agree, a reduction in the amount of weapons that we currently have and the amount of warheads that we currently have available to us.

DR. GARWIN: That's my view. Some people see the security of the United States only in an unending arms race with the Soviet Union, but not I.

ASSEMBLYMAN BATES: Would most people here agree that we could in fact sufficiently defend our country and have sufficient ability to survive a nuclear attack and in fact have enough deterrent to prevent a nuclear attack with roughly 1,000 warheads? I guess it would be warheads. There could be more than one warhead -- 1,000 missiles.

DR. WHITE: Let me suggest that while I think there is general agreement that lower levels of nuclear weapons on both sides might be very desirable both for stability and for reducing risk of nuclear war, there is some debate about precisely how low that level can go and still maintain a stable relationship between the two super powers. Some of them have said that the number is as low as 1,000. I think there are some who say that the number needs to be higher than 1,000.

ASSEMBLYMAN BATES: What is the range?

DR. WHITE: Let me just pick, for example, a number

that has received considerable public attention lately. That is, reductions of 50 percent. At least that would be regarded fairly uniformly as a significant first step towards reaching a more stable relationship.

Let me also add that there is some question about whether or not the existing inventory of weapon types would be sufficient for the foreseeable future to maintain a stable relationship at those lower numbers of weapons.

I think one of the lessons that we can learn from history is that developments outside of the area of nuclear technology may serve to imperil the viability of nuclear forces and that in the past at least -- and perhaps we can project from past experience -- judgments have been made that new types of nuclear weapons might be required.

That does not mean that one might wish to increase the overall numbers of nuclear numbers, but rather trade types now in the inventory for types that might have to be developed to meet new circumstances.

Those judgments have been made in the past. It is likely that history will demonstrate that in the future such judgments will also be made.

ASSEMBLYMAN BATES: I'm wondering if the unthinkable were to occur and we were to have a strike by some adversary and they were trying to knock out our capability of responding, what would the planet be like in relationship to what we've heard about potential nuclear winter and is that a feasible option for anyone to realistically consider that as an option; an all-out first strike attack on another country

given the type of buildup from the fallout themselves.

If that occurred, wouldn't it doom the planet, if in fact we did have such an attack, if we then countered and unleashed our nuclear weapons? Wouldn't that assure that the planet would in fact enter into a nuclear winter?

DR. GARWIN: Let me answer first. I don't think that the planet would be destroyed. I think the human race would survive.

But I think what deters the Soviet Union is the certainty that there would be a U.S. response. Our response, in my opinion, would not be eliminated because of our fear of nuclear winter. So, the Soviet Union sees a direct reaction to their potential strike and is deterred from doing that.

ASSEMBLYMAN BATES: What about nuclear winter? Is that some idea that now people in science consider not to be a valid proposition?

DR. GARWIN: I think that as many as a billion people would be killed without nuclear winter. That is, through direct destruction, fallout and other known phenomenon. Nuclear winter might double that. It wouldn't change things in order of magnitude. It wouldn't eliminate the very last people. So, I think that nuclear war is bad enough with or without nuclear winter.

ASSEMBLYMAN BATES: We'll all stipulate to that. I was just trying to think about the activity that if you in fact incurred a strike, you would in fact have some repercussions very directly on your own country. Assuming that you would then respond -- because we will have the

capability of responding if with nothing more than our subs and other missiles that are capable of moving and are not easily identifiable as to their location, they'll be able to respond.

So, my question would it be just madness to ever contemplate it in the first place with the destruction of the country that you attack, but it also could rebound to have effects on your own country.

CHAIRPERSON WATSON: Assemblyman Bates, I'm reminded of a hearing that this Committee had in this same room several years ago when Beverlee Myers was the director of the Department of Health Service. We had the western regional representative from FEMA, a department of the Emergency Management Agency to testify. And we've been interested and this Committee has had a history of having hearings on just exactly what you're raising now. We were concerned about the nuclear winter, we were concerned about our participation in further research and testing of nuclear weapons.

The representative from FEMA said in front of the Committee that if we had a six-day warning, that we could move the population of, say, Los Angeles from a high priority area to a low priority area. His suggestion was somewhere up around Edwards Air Force Base. Six days.

As the testimony went on and on and on, several members of the Committee found that the ridiculous nature of testimony made it unbearable to sit through it. So, we terminated the testimony.

When Beverlee Myers came up, she said, I want to

reassure the members of this Committee that not a penny of state money will be spent to further that kind of strategy and planning for a nuclear holocaust.

Now, her position then was that she saw that this probably could never be. We could never get the population of Los Angeles on the 410 away from Los Angeles up to Edwards Air Force Base, a few score miles away from Los Angeles, from the epicenter, to protect the several million people that would try to get out of town and certainly weren't going to be given a six-day warning.

ASSEMBLYMAN BATES: See, my concern is a little bit broader. Like, for instance, when they had the nuclear accident in the Soviet Union, people in Europe were greatly concerned about being able to drink milk. They had pregnant women with children. They were directly concerned about what happened just from that little fallout. You can imagine what the fallout would be in an all-out attack on the United States.

It would seem to me that particles would go into the atmosphere that would be damaging to the planet for centuries. Then if you were to counterattack, that would be the absolute icing on the cake.

Now, if that theory is not true, then I would like to hear that that's not true. Because I hear some ideas from some people in this administration talking about winning a nuclear war or something, which seems to me to be absolute folly. You can't win a war like that.

DR. BROWN: Can I address that? Because you raised

the issue of nuclear winter and that is something we have studied at Livermore Lab.

I do not think you'll find any disagreement on this panel that the holocaust you've described is something that could be avoided. What we perhaps differ in is the approach to avoiding nuclear war. You can't win a nuclear war and I disagree with anybody who claims you can.

As far as nuclear winter is concerned, our laboratory took it under its own initiative to take some of its resources and dedicate them at our own expense to study the nuclear winter problem. It's an extremely uncertain scenario that's been portrayed. I think there are a number of scientists who do agree that there's a lot of uncertainties involved.

But there are many other reasons -- the threat of fallout, instant mass destruction and so on -- which are sufficient reason -- and Dr. Garwin pointed this out -- to avoid that situation in the first place. That's all I wanted to say.

ASSEMBLYMAN BATES: Well, let me conclude. Unfortunately, I have to go now. I guess the panel will recess at a certain --

CHAIRPERSON WATSON: Yes, recess.

ASSEMBLYMAN BATES: I appreciate it. I've learned a lot. I didn't realize the University was involved with lobbying for funds. I gather the way it's put, it's not basically lobbying. It's a request for their opinions before various policymakers and they proceed to give their opinions.

I understand that it's advantageous for the Department of Energy to have the kind of research that's done. It's high-quality. I just really think it's a shame that the great University of California is involved in putting its prestige on the line to build these kinds of weapons and be involved with providing the administration to see this kind of happen.

I'd much rather it if the University would in fact devote more of its time in trying to figure out things like how we can avoid these conflicts, issues about using the weapons in another way, to decommission them and figure out a peaceful way of de-escalating this arms raise.

So, I gather that the Regents may not agree with that view, but I think as a public member that it's important for us to try to get the University out of this madness and this race and try to devote itself more toward ways in which we can be competitive with the rest of the world in a time in which our efficiency and our competitive advantage in other areas is sorely lacking and our scientists would -- not in building the great numbers that they are into the arms race and would in fact be trained in a way to help our country be able to build things like stereos and things that we can compete with the Japanese and the West Germans and the French and other people in ways to make our economy strong rather than devoting all this energy into things that hopefully will never be used and have very little, I think, application to our strong economy that we need to build in this country.

CHAIRPERSON WATSON: Senator Campbell.

SENATOR CAMPBELL: Madam Chair, it seems to me that we released the nuclear genie some years ago. Although we aren't particularly proud of that fact, we did release it.

Now, I guess it's the fact that our policy is mad. I think it's called mutually assured destruction. That, horrible as it sounds, is what's managed to keep peace for about 40 years or maybe a little more. Peace not necessarily as we want it, but as we know it today.

I think the dilemma in which we find ourselves is that we'd like to say, no more. It's like the inventor of the long bow, who said this is the ultimate weapon and they'll never invent something better. But somebody's going to come up with something new.

Unless we're capable of maintaining a degree of balance for the security of this country, then the potential for losing the freedoms and liberties that we have exists. I think that's the difference that reasonable people can have is how do you prevent the war.

CHAIRPERSON WATSON: Can I put you on hold? Because we'll continue with this and I do appreciate you staying through this period of time.

May I invite all of the witnesses, including the scientists at the UC system, the administration of the UC system, the scientists that belong to the Southern California Federation of Scientists, members of the Committee and the press to a hosted buffet luncheon at McKenna's. McKenna's is in the Ellis Building at 10th and L.

We will recess the Committee now and we will come

back at 2:00 and we'll go from 2:00 to 4:00. So, we'd like to have you in for a luncheon and we'd like to get you back and we are going to start right on time at 2:00.

(Thereupon the luncheon recess was taken.)

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AFTERNOON SESSION

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CHAIRPERSON WATSON: We're going to reconvene the Health and Human Services' hearing on nuclear testing at the UC laboratories.

I would like to ask all of the presentors who have written statements to be sure and leave that statement with us and please speak clearly into the mike. If you can talk a little slower -- some of you have a tendency to speak fast -- then we can get everything you say down. Be sure that you're speaking directly into the mike.

We will have two panels this afternoon. We will follow the agenda pretty much as it is in print and we will ask Committee members, if you can, to hold your questions until the end of the panel.

Panel II deals with the conformity of laboratory operations with national policy priorities. The lead-off speaker is Dr. Paul S. Brown, Assistant Associate Director for Arms Control, Lawrence Livermore National Laboratory.

Dr. Brown.

DR. BROWN: I don't have any written comments, prepared comments, to add to my statement of this morning; but I would like to submit some information for the record.

Dr. Batzel, director of the laboratory, was asked a number of questions in writing before this hearing and he responded to those questions directly. I don't have a lot to add to those except that with respect to the issue of on-site inspections, I have some written testimony that was prepared

by a seismologist at Livermore named William J. Hannon, Jr. He's Assistant Verification Program Manager and a noted authority in the field of seismic verification. He's written some testimony which discusses the difficulties and the possibilities of monitoring a Comprehensive Test Ban Treaty when it's required. In here he addresses in some detail the role of on-site inspections.

He also wrote back in January of 1985 an article for Science Magazine on the same subject and I'd like to submit both of these for the record.

Also, there was just released a report written by Jack Rosengren in response to the report that Dr. Kidder wrote in response to Rosengren's first report. It's entitled "Stockpile Reliability and Nuclear Test Bans: A Reply to a Critic's Comments." I would like to submit this also for the record.

CHAIRPERSON WATSON: Thank you very much. We appreciate that and just see that our staff gets it.

Dr. Paul White we've heard from earlier this morning. He's from the Center for National Security Studies, Los Alamos National Laboratory.

Dr. White.

DR. WHITE: Madam Chairman, I'd like to keep my remarks for this panel fairly brief. I'd be prepared to deal with any questions later.

I would like to submit for the record and to the members of the Committee a statement delivered by Dr. Siegfried Hecker, director of Los Alamos National Laboratory,

on the occasion of hearings before the Senate Foreign Relations Committee Committee concerning ratification of the Threshold Test Ban Treaty and Peaceful Nuclear Explosions Treaty on January 15th of this year.

I'm going to make two fairly brief comments about one of the issues before this Committee this afternoon. That has to do with the conformity of laboratory actions with United States policy as expressed in the preamble language in a couple of the treaties in which this government is a signator or is complying unilaterally.

That language -- let me speak, for example, with regard to the LTBT treaty of 1963. For the sake of this discussion the language says:

> "Proclaiming as their principal aim the speediest possible achievement of an agreement on general and complete disarmament under strict international control and in accordance with the objectives of the United Nations which would put an end to the armaments race and eliminate incentive for the production and testing of all kinds of weapons, including nuclear weapons; in seeking to achieve the discontinuance of test explosions of nuclear weapons for all time ..." And so on.

The order of the language and the negotiation record with regard to this language is fairly clear that the goal of seeking to achieve discontinuance of test explosions of nuclear weapons is pursuant to the progress on an agreement on a general and complete disarmament under strict international control and in accordance with the objectives of the United Nations and the goal of putting an end to the armaments race and eliminating the incentives to the production and testing of all kinds of weapons.

I think U.S. policy for a number of administrations the last 20, 25 years is consistent. The goal of seeking an end to nuclear testing follows from success in eliminating the needs for nuclear weapons and that in turn will follow from success in eliminating some of the source of tensions between countries and progress towards achieving a rule of international law.

That will conclude the comments that I would be prepared to make at this time, but I would be happy to answer questions.

CHAIRPERSON WATSON: Thank you.

Dr. Herbert York, Director of the Institute on Global Conflict and Cooperation.

DR. YORK: I have very little to say at this time, too, except I'd be glad to answer questions.

CHAIRPERSON WATSON: Do you want to hit that button on the mike?

DR. YORK: I'll just repeat that I have no prepared statement and I have little to say, but I'd be glad to answer

questions if any are directed to me.

I do make one short remark though. The title of Panel II is the "Conformity of Laboratory Operations with National Policy Priorities". People who raise that as a question usually have in mind the fact, as was correctly stated this morning, that every President of the United States until the present has stated that a test ban is his policy.

That, of course, hardly exhausts what Presidents have had to say about national security and most of the time they in fact take up issues which are quite distant and different from a test ban in the area of national security.

I don't think any of us would want the laboratory directors to make their own private interpretations of what it is the President has in mind when he makes his various general and political statements at the State of the Union Address or wherever. The only way statements like that, the totality of the President's plans can be put into action are through a necessarily bureaucratic process involving in this case the Department of Defense, the Department of Energy and both at the presidential appointee level and then at the bureaucratic level where they work out in detail a program of activities at the laboratory designed to accomplish a long list of stated objectives; some of them long-term, some of them short-term.

Similarly, the laboratory's program is worked out in connection with the budget process. In fact, most of the details are in fact worked out in that connection. That

forms the backbone of the policymaking process.

In working out that, all of that ultimately goes before the Congress for their final decision and the program of the laboratories in considerable detail is contained in ultimately the budget proposal that is enacted by the Congress and then also approved by the authorization committees, as well as the appropriation committees.

I can't discuss everything -- I don't know enough to discuss everything in detail. There isn't time. But it certainly is my observation that in terms of the directives and instructions they receive from the working authorities in the Executive Branch and in terms of the budgets that are approved by the Congress in the appropriations and authorizations committees, the laboratories do indeed work in conformance with national policy.

CHAIRPERSON WATSON: Thank you.

Dr. Hugh DeWitt, Lawrence Livermore National Laboratories.

DR. DeWITT: I am a physicist and have been on staff of the Lawrence Livermore Laboratory for 30 years. During my time as a staff member of a nuclear weapons laboratory, I've come to some opinions that strongly differ from what the previous speakers have said and I'm going to lay on the line saying something very, very different which will invite perhaps debate and rebuttal. That, of course, is just fine.

But, anyway, I want to make the case that the weapons laboratories in the course of the last 40 years since World War II have emerged as very large, powerful, ongoing

permanent institutions in American life dedicated to developing nuclear weapons technology.

Developing nuclear weapons they have been very, very successful. The University management has allowed very high-quality people to join the laboratories for permanent careers and I think in a technical sense they have done a very good job in developing a great range of nuclear weapons.

The other side of it is that they've also emerged as an institution with very great influence on national policy. Particularly in this session I want to address the question to what extent the weapons labs themselves actually dictate US national policy. In other words, I'm going to directly contradict what has been said by Paul Brown, Paul White and even Herb York; all of whom I respect and we can argue.

First of all, I want to make it very clear the laboratory managements are not neutral, unbiased scientific groups giving simply neutral technical advice to the U.S. government. It is my opinion from my careful reading of statements by the laboratory directors to the various congressional committees -- the House Armed Services Committe, Senate Armed Services Committee, Senate Foreign Affairs Committee and so on -- that in fact the testimony given to Congress is very often highly advocative of continued nuclear weapons development work.

I mean, the people in the laboratories who have ridden to the top believe in their work and believe in the need for ongoing nuclear weapons testing and development for the foreseeable future. Thus, the laboratories have become a

center of opposition to nuclear test ban agreements of any kind whatever.

Over and over again in my 30 years of experience with the laboratories I have seen examples where the laboratories have strongly intervened to block in their view the threat of a test ban treaty of any kind. That goes on right now to the present time.

Now, there is the very sticky question of to what extent do the laboratories dictate national policy by the way they design nuclear weapons. I don't think there's anything consciously malicious here. It's just the way things fall. The laboratories are centers of exuberant technical excellence. They are the institutions that have the weapons experts. They have the physicists who design the weapons, which then are tested in Nevada and which actually work. The Congress generally are people who are not technical experts and have to rely on what the laboratory people say.

By a process of, well, just interconnection between the laboratories and the Department of Defense and the Department of Energy, it turns out that the expertise of the weapons laboratories influence very much what actually happens in the way of developing nuclear weapons.

There's a constant flow of laboratory management personnel between the labs and Washington. So, it's very easy for the nuclear design expert from the labs to explain to officials in the Department of Defense and the Department of Energy what is possible and what is desirable in the way of designing nuclear weapons.

I've also maintained, by the way, that the laboratory directors actually go out to Washington and lobby for new weapon systems. In the process of competing between the two laboratories, there's a great deal of effort to, in effect, sell new weapons ideas. This isn't necessarily bad, but it's something that everybody should be aware of. The laboratories are not neutral experts on this. They're in a position to give what they believe as evidence.

Now, the process of how they influence national policy. Clearly, the policy decisions are made in Washington. For example, there is a Military Liaison Committee between the DOE and the DOD; which is headed, for example, by Richard Wagner, who used to be the Associate Director for Nuclear Design at the Livermore Laboratory for several years.

My point here is simply that there is a constant flow from the technical people from the labs to Washington and back and forth, but the expertise resides in the laboratories. Because of this fact, it's very easy for the design policies of the laboratories to be in fact decided at the laboratories themselves. I think this is what happens.

Now, I've spelled it out in an article in the Bulletin of the Atomic Scientists. So, it's on the record and I submit this for the record and I'll back it up with a couple of statements.

So, the recommendations of the labs become policy decisions which the labs actually wanted in the first place. The result is the weapons labs have evolved policy which in

my opinion is contrary to what is embedded in the treaty agreements of the United States made, for example, in 1963. The U.S. and the Soviet Union signed the Limited Test Ban Treaty, which was discussed a moment ago. The preamble says that the discontinuance of all test explosions of nuclear weapons for all times is a goal of eventual negotiations. In other words, the U.S. is basically committed to a Comprehensive Test Ban Treaty.

Whether any President actually wants it or not, that's another matter. I'm sure many Presidents probably didn't even mean it. But, nevertheless, on paper they're committed toward negotiating such a treaty.

Now, Glenn Seaborg for ten years -- this is Professor Glenn Seaborg now at UC Berkeley, Nobel Prize winner for the discovery of plutonium. He was the head of the Atomic Energy Commission for ten years from '61 to '71. He stated that when he was in charge of the agency, that the design policy at that time was one which would be compatible with going to a test ban and a comprehensive treaty.

But after 1971 there were some changes in the design policy as the nuclear designs became more efficient and more sophisticated. An example is Dr. Roger Batzel of the Livermore Laboratory in testimony at the House Armed Services Committee on September 18, '85 said:

> "I have the responsibility to certify that all weapons that have been designed at my laboratory will function when and if they are ever

needed. These weapons were designed under the assumption that nuclear testing would continue, so that if any problem ever arose in the stockpile, a nuclear test could be performed to help certify that the weapon would continue to work as it was designed to."

Now, what this means to me is that the labs are assuming that there never will be a test ban treaty. They've had good luck in promoting that belief for the last 25 years. I think the lab managements are rather confident that they can continue blocking a test ban treaty at the present time.

Now, from a purely technological sense, it's obviously inappropriate and unreasonable to continue testing to make sure your weapons work properly. Nevertheless, there are large political considerations which have perhaps not been taken into account.

The laboratories have been able to push the designs up to the limits of what is possible and make these very sophisticated weapons from which they can turn around an argument and say that our weapons are so sophisticated and so delicate that we must continue testing. Otherwise, in later years we may make some things that won't work and our stockpile reliability will go down.

So, in my opinion the laboratories themselves have created a self-perpetuating situation. They've created a built-in argument against ever having a nuclear test ban

treaty. A very, very important point.

Now, to go on further. It's quite true, as has been discussed here several times by several people, that there have been problems with some of the nuclear weapon designs that were supposedly all properly tested and proven. Thus, last spring in testimony to the Senate Foreign Affairs Committee Dr. Roger Batzel responded to a question by Senator Kennedy about whether nuclear testing was needed to guarantee reliable stockpile. And his answer included the sentence:

> "In actual fact, in the 25 years since testing resumed after the 1958-1961 moratorium, one-third of all modern weapon designs that were thoroughly tested before entering the stockpile have required post-deployment nuclear tests."

In other words, there's been some apparent real technical deficiencies. Now, we're not really blaming anybody for this fact. But the point is that the laboratories now are making it a very big point that proven weapon designs in fact were not so proven after all and require a lot of nuclear testing to correct troubles.

Now, this argument, I submit, has emerged as one of the most important arguments from the Reagan administration against a nuclear test ban treaty with the Soviet Union.

To add to the statement, Dr. Paul Brown -- right here -- recently in a talk pointed out that the -- Dr. Batzel's statement -- "one-third of all modern weapon

designs" actually meant 14 weapon designs out of a total of 41 had defects. Thus 41 designs were put in the stockpile, what, 26 years ago; 14 of which had defects which extensively needed further testing. This morning you heard Dr. Ray Kidder dispute eight of those examples.

Now, at least a few people in the weapons laboratories do not believe that the statements by Dr. Batzel and Dr. Brown really support the contention that continued testing is essential to maintain a reliable stockpile.

Our interpretation is that in fact most of these 14 designs -- at least the ones we know about -- were simply for various reasons inadequately tested before they were put in the stockpile. But when you have a truly proven nuclear weapon design, it should be possible both to maintain its lifetime -- its lifetime being 15 or 20 years -- and that at the end of that time to replace it by identical copies, remanufactured copies, and thus guarantee a reliable stockpile of weapons for deterrence purposes for years and decades after a test ban.

Of course, this requires that you have to have the exact same materials. There's an argument about whether those materials would be available. But many of us think they should be available.

Professor Glenn Seaborg again has pointed out that the kind of reliability testing that's being discussed currently was never an issue when he was head of the Atomic Energy Commission in the 60's and that he doesn't believe that the arguments given now are truly necessary to maintain

a reliable stockpile.

But these are technical questions which are often obscured by classification barriers. Thus, it's difficult to address many of them in an open forum like this. We can only talk about truly unclassified matters. Some of the issues are classified and thus require experts with proper clearances to address them.

Now, it's my opinion that what is needed is a careful examination of these reliability arguments by a committee of outside expert scientists with full access to all classified information. The laboratory spokesmen are all good, decent people sitting right here in front of me. But, nevertheless, there can be bias and a purpose in some of the statements.

So, what I'm calling for is that these arguments, complete with classification restrictions, be looked at carefully by other competent scientists outside who can assess the arguments and come up with an independent judgment.

Now, I wanted to also comment on just another of Dr. Brown's statements. He gave four reasons for why we do nuclear testing. I won't recite them all, but they were quite clear. The number two reason was modernization of the stockpile to take it against new military needs.

The fact is in my observation the bulk of nuclear testing done in Nevada is -- and that's modernization. But it's much more than that. The modernization of our stockpile actually means the development of new weapons designs, the

exuberant continuation of the whole development process. And, particularly, in the last several years there's been a new class of nuclear weapons that have come into discussion. These are the directed energy nuclear weapons proposed for the Strategic Defense Initiative; nuclear bombs which will explode and put some effects of energy into a beam that will go in a straight line through space or maybe through atmosphere to impact on a target.

The nuclear pumped x-ray laser example is the prime example. But there's a number of other devices that will generate microwaves, for example; all of which are being researched with great enthusiasm at the Livermore Laboratory and at Los Alamos to a lesser extent.

This kind of effort keeps laboratories in business. It's exciting, interesting technical work. Whether it's good for the world, that's another matter. I tend to think it's not. I tend to think that it should be put on hold for two or three decades.

But this kind of work goes far beyond just the question of modernization and maintenance of stockpile reliability. In my opinion, the laboratories are in the business of continued nuclear weapons development full scale, full blast for the rest of this century. I believe that is the primary reason why the laboratories are so utterly and strongly opposed to any form of a nuclear test ban.

So, my points then are I believe that the weapon types themselves de facto dictate U.S. nuclear weapons design policy to a very large extent and that this is the basis for

the Reagan administration's opposition right now to any kind of a test ban. I mean, they're working hand in glove.

I further maintain that the strongest arguments in a technical sense that the laboratories have come up with against a test ban has been this reliability question. I believe if this were examined carefully by a group of unbiased -- if you can find such people -- competent scientists with access to all relevant classified information, the case against continued testing for stockpile reliability would not really hold up.

It should be examined. I may be wrong. But that is my belief and my opinion from my knowledge as a staff member.

I would further comment that the University of California is a nominal manager of the weapons laboratories. The University is not really equipped to do this job very well.

In the next session I'll speak to the Scientific Advisory Committee, which is the only group that can look at it. The Scientific Advisory Committee for the laboratories that reports to the UC president has not yet done this job. If it can't do it, then the Congress should find some other body of scientists who can look at these arguments and assess them and either approve them or disprove them. I think I'll stop there.

CHAIRPERSON WATSON: Thank you so much, Dr. DeWitt.

I'm going to ask that the presentors please stay within the ten-minute timeframe so we can get through the other panel, too.

Dr. Ray Kidder, Lawrence Livermore National Laboratories.

DR. KIDDER: This morning I was dealing with what, I'm afraid, were somewhat overly technical questions having to do with the problems in stockpile that have been observed over the past. This afternoon I want to talk much more directly to affairs having to do with the University of California itself and particularly in connection with the University of California's Scientific and Academic Advisory Committee.

Now, I've had firsthand experience with an important aspect of this involvement -- that is, the involvement of the University of California in the design of nuclear weapons -- for nearly a decade. It's my conclusion -- and I'm sorry to say this -- that the University has not done an adequate job of overseeing the two weapons laboratories it operates under its contract with the Department of Energy. That's particularly so with regard to the conformity of laboratory operations with national policy priority. Let me briefly outline the basis for this conclusion.

In 1963 -- I think this has been mentioned before, but it's worth repeating -- the signatories to the Limited Test Ban Treaty -- the United States, the United Kingdom and the Soviet Union -- stated that they sought to achieve a treaty resulting in the permanent banning of all nuclear test explosions. This goal was reaffirmed in the Nuclear Non-Proliferation Treaty in 1968, the Threshold Test Ban Treaty in 1974 and it was supported by at least the five most

recent administrations, including the present one.

Now, in 1977, which is ten years ago, a decade ago that I'm referring to, shortly after Senator Edward Kennedy had introduceed a resolution in the Senate calling for a Comprehensive Test Ban, I brought to the attention of the Scientific and Academic Advisory Committee -- and to save time I'm going to call it the SAAC -- of the University my concern that the weapons labs seemed to be conducting their nuclear weapons design work in a manner prejudicial to the national policy option of the CTB, Comprehensive Test Ban.

The Scientific Advisory Committee is that committee reporting to the University president whose responsibility it is to oversee the scientific activities of the two nuclear weapons laboratories. So, they're the ones that are involved with these interactions between the University and the weapons labs.

Now, in 1978 -- that's a year later -- Roger Batzel, Director of the Livermore Lab then and now, stated, "I believe the continued credibility of the U.S. nuclear weapon deterrent cannot be assured for long without nuclear testing." That's a plain, frank statement.

Again, in 1982 -- now, you'll notice five years have gone by. I wasn't quite as persistent as I suppose I should have been on this matter -- I tried to engage the attention of the SAAC in the matter of our nuclear weapons planning vis-a-vis the possibility of a test ban in a written statement dated February 23rd. This statement closed with the words:

"It has occurred to me that technical questions concerning the performance of nuclear weapons may be out of bounds to the Committee. In as much as the design of nuclear weapons is the principal reason for the laboratories' existence, I would hope that such is not the case."

I was assured by the Committee that such was not the case and that the issue I had raised had troubled it for some time. I was led to believe that it would be placed on the Committee agenda for a future meeting.

I then wrote to David Saxon, president of the University, bringing the matter to his attention and urging him to direct the SAAC to look into it. I'm going to read this letter I wrote. It's very short. I'm going to read it.

"Dear Dr. Saxon."

This is dated July 2, 1982.

"At the February 25 meeting of the LLNL and LANL Scientific and Academic Advisory Committee I submitted a written proposal for action by the Committee that concerns a matter of vital significance for national policy concerning nuclear weapons (copy enclosed). The Committee agreed

that the issue was indeed important, had troubled it for some time and would be placed on its agenda for discussion at a future meeting. The chairman explained that the agenda for the July meeting had already been decided upon, but he assured me that it would be placed on the agenda at a subsequent meeting as soon as practicable.

"The Committee will be meeting in Livermore on July 8-9 and will, I assume, report to you shortly thereafter. If you agree that the question of the necessity of continued nuclear weapon testing is an important technical question ..." A technical question, not a political question "... that lies within the proper purview of the Advisory Committee and that needs to be settled, then I hope you will encourage the Committee to take it up at its next meeting. I believe this question transcends in importance most, if not all, of the questions customarily addressed by

the Committee.

"I would welcome any comment you may care to make concerning this matter.

"Sincerely, Ray E. Kidder, Associate Division Leader, Theoretical Physics Division."

A copy went to Mr. John Henning, who was a Regent of the University at that time and was the chairman of the Regents Oversight Committee for the laboratories. And a copy went to Professor Harold Weaver, who was the chairman of the SAAC at that time. So, that's what went from me to them.

In spite of my efforts and my expectations that the SAAC would put the issue on its agenda, nothing was done.

I was eventually informed verbally by Dr. Harold Glaser, then Special Assistant to President Saxon, that the SAAC had decided it was not a proper forum to consider questions of nuclear weapons program planning.

I want to be very clear that what was involved here are scientific issues having to do with nuclear weapons. They have nothing to do with politics or policies about arms control or things of that kind. We were asking and we explicitly made the statement clear and it was understood by the Committee that this was a technical issue.

In the fall of '85 -- that was another three years that went by and we're getting up to date and this has been mentioned just a few minutes ago -- Roger Batzel testified before a committee of Congress that these weapons were

designed under the assumption that nuclear testing would continue.

All right, now combined with Dr. Batzel's earlier statement that we had to continue nuclear testing, as I read earlier, this frank admission clearly implied that our nuclear weapons had been so designed -- had been so designed -- that a ban on nuclear testing would threaten our national security. This was precisely the situation that I saw developing at least as early as a decade ago.

Now, more recently -- or I should say most recently -- a group of University physics professors expressed their concern to the University President -- and I'm quoting from their letter:

> "That the weapons laboratories design strategies over the last decade or more are said to be inconsistent with a Comprehensive Test Ban in the foreseeable future."

Now, my conclusion is that the University of California and the Scientific and Academic Advisory Committee have not done their job in overseeing the principal activity of the weapons laboratories. The principal activity of the weapons laboratories is nuclear weapons design.

Neglect of this important responsibility has contributed to the present dilemma in which the weapons labs claim to have foreclosed -- and, I mean, they claim to have foreclosed it -- the stated national policy goal of a

Comprehensive Test Ban by the manner in which our nuclear weapons have been designed.

I'd also like to point out that the design cycle for nuclear weapons is a very long process these days. What it amounts to is that from the point at which a decision is made to study something at the weapons labs as an idea phase to the time when it finally is deployed in our stockpile, the time for that to happen these days is about ten years.

In other words, what I'm saying hear is that decisions that are made today will influence this country ten years from now when it comes to nuclear weapons design. So that had something been done about this -- at least had the University of California in my view done its job and looked into this issue ten years ago when I first brought it to its attention -- I don't know that I was the first one that did, but I did it then -- we might not be in this fix that we're in right now. So, that's the bad news.

The good news is that there is, however, some indication that the Scientific Advisory Committee may at long last be willing to do something. Better late than never. Two months ago I received a verbal request from its chairman, Professor Frederick Reines, for information concerning my evaluation of evidence that the weapons labs had presented to demonstrate the necessity of continued nuclear explosive testing, which I've described to you this morning; to which I have replied. That is, to Fred Reines. This has induced in me a state of mind that I would describe as cautious optimism.

I might say that I'm slightly more than cautiously optimistic, but only slightly. I received a telephone call yesterday morning from the chairman of the SAAC, Fred Reines, asking me for further information and telling me that he and his committee do intend to look into this issue. So, I just heard that yesterday morning after I had written this statement about cautious optimism. But that sounds good to me.

Now, finally, my criticism of the University's oversight of the weapons lab should not be construed as a reason to sever that relationship. Quite the contrary. This may sound funny coming from me. The reason is simple. Were it not for the freedom to express dissenting views that this relationship encourages and affords, I would not be able to present these views to you here this afternoon.

So, that is what I think about the relationship. I think it should be continued. I think it's an important protection. I think it's part of the principle of the civilian control, if you will, of nuclear weaponry that is very fundamental to this country.

On the other hand, I believe that the exercise of that responsibility by the University through the Scientific Advisory Committee ought to be made a lot stronger than it has been in the past and particularly in relation to this issue. I'm encouraged by what I heard from Fred Reines yesterday morning to believe that maybe it's going to be. Thank you.

CHAIRPERSON WATSON: Thank you for your candid

remarks, Dr. Kidder.

I'd like to call on now John Holdren. Dr. Holdren is a physics professor at UC Berkeley.

DR. HOLDREN: I am John Holdren. I am a Professor of Energy and Resources at the University of California's Berkeley campus. I'm the immediate past chairman of the Federation of American Scientists and I was in 1970 to 1972 a fulltime member of the technical staff at the Lawrence Livermore Laboratory where I worked as a theoretical plasma physicist in the Magnetic Fusion Energy Division.

I did have some prior involvement in the nuclear arms race. From 1961 to 1969 I worked at the Lockheed Missiles and Space Company in a variety of capacities, including on reconnaissance satellites on the Polaris system, on the Poseidon system and in a number of other programs.

I also have some history in looking at the relationship between the University of California and the weapons laboratories in that I was a member of the study conducted by the Energy Research Advisory Board of the U.S. Department of Energy of that relationship in the 1978-79 period. In fact, I think that was the study quoted by Vice President Frazer this morning. In fact, I was the author of the minority report in that particular study from which he, I believe, quoted the majority of the Board.

I mention all this to establish as a preface to my testimony here that I do have some familiarity with the history of the arms race with the Livermore Lab and with the relation between the University and the Lab. I'm going to

talk about both of those issues.

There are two panels, I understand, this afternoon. This first one, The Conformity of Laboratory Operations with National Priority Priorities, is one that calls for a broad approach. The second one deals with the University relationship. I propose to divide my remarks along those lines.

I have for the record two brief statements, one addressing each of those two points. Both are recycled, as is our inclination in the energy and resources program, from previous presentations. But they do directly address the issues on the agenda here.

With respect to the conformity of lab operations with national policy priorities, in a sense the problem at the moment is the lab policy is completely compatible with the stated U.S. policy priorities at the moment. Those priorities at the moment are that a Comprehensive Test Ban is a long-term goal, but most specifically not a short-term goal of the present U.S. administration.

I think it's worth quoting here a letter to that effect that was written on behalf of Secretary of Defense Weinberger by Frank Gaffney, the Deputy Assistant Secretary of Defense for nuclear forces and an arms control policy to Congressman Markey a little over a year ago, January 1986, in response to an inquiry about what the Department of Defense position on a CTB is. One of the last sentences in that letter is as follows:

"I believe there is historical

consistency in our position that a Comprehensive Test Ban is a long-term objective to be achieved in the context of verifiable arms reduction, substantially improved verification capabilities, expanded confidence-building measures, greater balance in conventional forces and at a time when a nuclear deterrent is no longer as essential of an element as currently for international security and stability."

That's a rather long series of conditions including especially the last and it's part of a letter that states very clearly again that the present policy of the U.S. Executive Branch is definitely not to support a Comprehensive Test Ban.

This leads to my central point here. The problem at the moment, I believe, is that the diligent pursuit by the laboratories of their duties as traditionally defined has in fact been helping to drive the nuclear arms race; and, further, that the effect of that nuclear arms race, which has been driven in part by the diligent pursuit of the laboratories of their duties, has been and continues to be to undermine rather than reinforce our national security. That is, that the nuclear arms race has on the whole been making us not safer, but less safe as time goes on.

Now, if this is in fact so -- and I'll return to the arguments that lead some people to suppose that it is so. But if it is so, then the idea that the University management of the weapons laboratories is a public service is at least problematical and certainly needs to be looked at more closely. Again, I'll come to that in the second panel later this afternoon.

But let me return for the moment to this central question of national policy priorities and whether the diligent pursuit by the laboratories of their duties as defined under those priorities is helping us or hurting us.

I would suggest that the real danger associated with the nuclear arms race does not reside very much in the numbers of nuclear weapons per se or in the total megatonnage. What is really dangerous is that the chance that these weapons will actually be used, which in my view is already intolerably high, has been made even higher by a series of changes in the qualitative characteristics of the weapons that have been going on on both sides over the years under the mantle of modernization.

Modernization is the term that is used by both sides to justify the series of innovations in nuclear weapons technology that in fact on the whole and in the main, I think, have made us less safe.

Now, I would suggest that that has happened in three different ways. That is, we have been made less safe by three different elements of this process that has gone on in the nuclear arms race.

The most obvious one is that both sides have been deploying strategic nuclear weapons whose combination of explosive power and accuracy and flight time gives them disturbing capabilities for pre-emptive attack against the nuclear forces of the other side. That situation promotes mutual fears of a disarming first strike and encourages hair-trigger postures in which the chance of a nuclear war through electronic or mechanical malfunction combined with human error becomes considerable.

The second way that trends in nuclear deployments have been making us less safe rather than more safe has been through the integration of short-range and medium-range nuclear weapon systems with our conventional forces in ways that increase the chance that conventional conflicts will become nuclear.

Now, in large part this has been deliberative, a deliberative part of our strategy in trying to use nuclear weapons to deter conventional conflict. By making it so likely that a conventional conflict will become nuclear, any potential adversaries would be afraid to start even a conventional war.

This policy, as well motivated as it may have been, I think has been profoundly in error and has led again to the deployment of specific nuclear forces which we were able to develop and deploy through nuclear testing; which have made the chances of any conventional conflict of whatever cause becoming a nuclear conflict. These chances have become again, I think, intolerably high.

The third way and the most solid way -- but not the least important -- the trends in the nuclear arms race have been aggravating our security dilemma, have been undermining our security is that nuclear weapons can no longer be considered merely the symptom of an underlying nuclear confrontation. They now have to be considered also part of the cause of the problem.

By this I mean the following: Deployment of nuclear weapons in particularly threatening postures become perceived as evidence of pernicious intentions. That builds resentments, it heightens the tensions, it provokes counter-deployments that feed the whole arms race spiral of action and reaction and counter-reaction.

Lots of people look at the arms race and they say, look, the real problem is the U.S.-Soviet relationship. But they are only partly right. It is true that if the United States and the Soviet Union got along like the United States and Canada, neither side would have any use for these huge arsenals of nuclear weapons. But the way the United States and the Soviet Union continue to shove nuclear weapons of ever more threatening forms in each other's faces is in fact feeding that controversy. Again, it can no longer be considered just a symptom of an underlying problem, but it really is a contributing cause of that hostility.

Now, the final question I want to address before stopping and coming eventually to the second panel on the University's role is this question of whether testing itself, nuclear testing itself, has been a very important force in

driving this arms race process whose unsettling characteristics I've been complaining about. It is certainly true that nuclear testing has not been the only force driving this process. Lots of other things have been at work. But it has been a crucial force.

By the testimony of the nuclear weapons makers themselves, a nuclear warhead is such a sophisticated and finely-tuned piece of equipment that almost any change in the delivery vehicle or the launch system or even the mission profile may in some circumstances require a new warhead design.

What this suggests is that if you cannot have new warhead designs, if you cannot do nuclear testing and you will not have new designs, then you will not have new delivery systems, new capabilities, new attempts to nourish the illusion that nuclear weapons have military functions, military purposes, detailed missions that they can carry out.

It was only through nuclear testing that we were able to develop nuclear weapons compact enough and durable enough to fit in a six-inch artillery shell and thus permitting the almost complete integration of nuclear conventional forces. It was only through nuclear testing that we were able to develop a warhead at once powerful enough and light enough to be mounted 3, 5 or 14 at a time on a single missile; producing the multiple independent re-entry vehicles that made it possible economically to attack the silo base missile forces of the other side, produce the window of vulnerability and destabilize the arms race to an

appalling degree.

It will only be through nuclear testing that we will get a bomb pumped x-ray laser; which has further destabilizing possibilities that could be the cause of another hour's argument here, but which I will skip.

The central point is, again, this part of my testimony -- and I'll stop here -- that the matter of a Comprehensive Test Ban is not peripheral to the nuclear arms race and our safety, it's absolutely central and that we must expect the nuclear weapons laboratories, given their obligations and given present national priorities, to oppose a Comprehensive Test Ban and to advocate the continuation of nuclear testing. That shouldn't surprise anybody at all and it shouldn't be the cause of any accusations that the weapons laboratories are not doing their jobs as traditionally defined.

I think the question for the University of California again is a larger one. It's whether that job as traditionally defined is one that is actually improving the national security of the United States and, if it is not, what the University's role should be in improving that situation for the better. Thank you.

(Applause.)

CHAIRPERSON WATSON: Thank you so much.

I did want to -- Senator Torres. I wanted to acknowledge that Senator Torres -- I wanted to introduce you as you went out the door. Thank you for participating, Senator Art Torres. Thank you.

Dr. Carson Mark with the Los Alamos National Laboratories, retired.

Dr. Mark.

DR. MARK: Madam Chairman. First, I should identify myself. I joined the Los Alamos staff in 1945 and stayed with it until I retired in 1973. Through that time I was the head, the nominal head, of the group that was responsible for weapon design at Los Alamos. That period went from the first crude fission bombs through to fairly advanced modern warheads. I was continually involved in that activity for that period.

I think in the interest of time, if you really have 4:00 in mind, I should try to say very little. Indeed, I don't know that it's necessary to say very much.

A lot of topics have been introduced and various things said about them in the course of both the first panel and this panel. I might like to just refer back to two or three of the things already taken up and either complicate the issue or throw a different light on it or something of that sort.

I might say that one of the things that's received a lot of discussion is the need of continuing testing for reliability of the weapons which are already tested and in stockpile. I think it was -- I know it was 1978 -- getting close to ten years ago -- that I and Richard Garwin, who was here this morning, and Norris Bradbury, who was the director of Los Alamos for the period since the war up until 1970, wrote a letter saying this testing is not necessary for

reliability of the existing weapons if you do several things. That is, make certain that you do not change them, don't introduce modifications, don't attempt any improvements; but make sure that you have a very intensive surveillance program that is supported and that you're prepared to rebuild a weapon if it shows that it's having trouble and you think you still need it and such things as that.

It's not a new topic to me. The things that Garwin said on that subject this morning sound to me just like we've been talking for the last ten years.

Now, it has been made into a big point and the administration's expressed concern about the fact that a test ban is not in the national interest and to the present lab directors' expressions on that same point. I still think that some of the arguments they use in support of that position are either irrelevant or I even think some of them are embarrassing that such fine people could make such sloppy arguments.

It has been said we must keep our scientists, because we might want to make changes if they're directed by military requirements to require a change. Well, that is not the same thing as saying that a weapon that's in the stockpile is going to get sick. It's going to say that any weapon you might build or the modification you might introduce without a test cannot be accepted.

Now, that point is absolutely 100 percent true from my point of view. You should not put into the stockpile weapons which have not been tested in the form in which you

expect to be using them. We heard that during the 1958-61 moratorium. It has been said we put weapons in the stockpile at that time. Not many, but maybe only five or six hundred of one particular model. Not many. When tested after the moratorium, they disappointed us very badly by a factor of at least two in their yield.

That established the theorem you mustn't do that. It didn't establish the theorem that a test ban is bad for us. It's just very clear the other way.

I wanted to throw that in on this subject of reliability. I know it's being made a main point. I think that is not a correct point. I don't really feel that the people who make the point are in any degree dishonest; although the point is, of course, self-serving and is accepted by people in Washington who don't know any better and don't wish to look any deeper as if it were a real point and, therefore, we know the answer.

Given the situation, then I come back to what John Holdren was just saying. The labs, although they may have influenced the national policy priorities, cannot be accused of not attempting to respond to what they are told are the national policy priorities.

They influence them not so much by political action. They're asked to appear and give their opinions. The directors of the labs must be in the position of responding on demand to requests from groups like this or congressional committees or members of the administration and the public, even the media. They must be left that freedom and they will

say what they think. We hope they will say what they believe to be true. If they're mistaken about that, then the effects are unfortunate. I think on this reliability point they are mistaken or they've picked up the wrong arguments and could be challenged somewhat on that.

However, they cannot be accused of not following what they have been given to understand are the national policy priorities. Those are settled by the administration departments in Washington and the administration itself and negotiated with the Congress. The Congress supplies money for some projects which is in their view consistent with their priorities and if it's some other project, they don't.

The labs really don't have any wide freedom of choice beyond following the directives which they have to keep working and developing innovative ideas and whenever you do, come and tell us.

When they come and tell them these innovative ideas, they sound attractive. They may even fit some need that the Air Force feels it has or the Navy or whoever and get adopted as part of the national priorities. But they don't decide that it is. They're not in the position to decide that it is, although they may very possible influence the decision. If they influence it, they make it quite clear in their action.

As I said, the directors have to be free to respond on demand to inquiries from a wide range of sections of the public. It has been suggested here that they have been uniform in their response to those inquiries concerning this

CTB that the CTB is bad.

Now, I think there's no question the CTB would be bad -- it would be fatal -- for a directive which its thought was to develop new weapons. You shouldn't bother developing new weapons if you had a CTB. They think that -- and so they say the CTB would be bad and they're right about that. I think they give wrong or dubious or half-baked reasons, but they're certainly right. We can't develop new weapons if we have a CTB. That, of course, in my point of view would be one of the great features of having a CTB.

I'm sure you're all aware that we used to be completely safe from nuclear weapons in 1945 and even in 1959. From that time on we have been less and less safe from nuclear weapons and less and less secure. So, not making a change in that progress in those fundamental national policy directives is simply going to keep us on the same slope that new weapons will come into our hands and into the hands of our opponents and we will become less secure and more concerned and properly more concerned.

I would like to remind people of two things which have not come up in the discussion so far. Back in 1961 approximately when the treaty was being negotiated which later became in '63 the Limited Test Ban -- only test underground -- in the first discussions of that it was discussed as a total test ban. But it got switched to a limited test ban in the course of the arguments in Washington both pro and con.

Norris Bradbury, then director of Los Alamos, took a

statement to the joint congressional committee, which I don't have here verbatim, but I have it very much in content, that these weapons we design cannot be used for any rational or desirable purpose. But until arrangements exist ensuring no occasion for their use, we must keep working on them. We think of ourselves as buying time until that political objective can be achieved.

Now, that is hardly the kind of thing you've been hearing today as lab directors' statements on national priorities. I think it was a very respectable statement. I think it should still be thought of as true, as applicable.

The other thing I would like to mention and then I'll get off the air is we have talked to the Regents' management of the laboratories. Of course, the Regents don't manage the laboratories, they manage the contract. The contract is for the labs to do what the Department of Energy tells them they would like to see done to the extent they can.

I think in managing that contract the Regents have always felt they've done an admirable job. They have kept the labs free to the extent possible from micromanagement from the offices in Washington. They're one of the few contractors which would have had either the courage or the inherent strength to not be easily influenced to change their mind that one could have found.

Anyway, we've talked of that management almost only in connection with the test ban. But that management -- I believe, Madam Chairman, you said $1.8 billion. Very close

to half of that $1.8 billion is for work of which one would be proud in California that the University was helping that work along has not got to do with weapons at all. At Los Alamos -- and I know that the same applies in Livermore -- an attempt to make a massive catalog of genes, which is of enormous use for genetic studies, is being supported and is in progress. Fusion power, as Holdren pointed out, is done at those labs.

You may have heard of the Meson factory at Los Alamos, a unique machine in the country used by people all across the country; much like the Stanford Linear Accelerator in its field is used at Stanford.

Half of the money spent at Los Alamos administered by the Regents comes very properly under the heading of constituting a national asset and being an activity in the public service. These don't change things you've heard, but I think you need to broaden the thoughts here a little beyond things which have been said earlier.

I'll leave it go at that so you'll have at least a little time for the third panel.

CHAIRPERSON WATSON: Thank you, Dr. Mark.

We're finished with Panel II. Are there any questions, Assemblyman Bates, of this panel?

ASSEMBLYMAN BATES: I'd like to pursue Dr. DeWitt's suggestion about having a group of scientists pursue the reliability question.

I'm wondering how would you suggest that be done? Is that in the purview of the University of California to

establish such a committee? In other words, in terms of resolving the question of reliability. Are there adequate people within the confines of the University? Scientists who are either affiliated with the University or who would participate in something like this?

DR. MARK: I would think of it as mechanically possible. I'm not sure that it is just a role that should be taken up by the University. It ought to be taken up by a congressional group like Markey's. If, say, you assemble a group, half of them might come from the University of California to go into this allegation that Ray Kidder has said was rather improperly based.

ASSEMBLYMAN BATES: Let me ask Dr. DeWitt.

DR. DeWITT: Among the nine candidates of the University of California, there are a fair number of expert scientists with the adequate background in physics, chemistry and other technical disciplines and who have at various times worked at the weapons laboratories as consultants or staff members who have had proper clearances and still get them. So, the expertise exists and the University of California can assemble it.

The closest thing we have to it is the UC Academic and Scientific Advisory Committee, which I'll speak to a little next panel, which has been asked to look into some of these technical questions. Now, I think they could make a good first pass at it if they have the will to do so. So far that has not happened. It may happen this year.

In general, though, I do think that it's a broader

national issue and eventually Congress should appoint or somehow constitute a group of independent experts that could do the job.

ASSEMBLYMAN BATES: I agree with both of the two speakers. It would be nice to have it done by the Congress. In the meantime, the state -- we fund the University of California in terms of trying to hopefully influence some of their direction. That would be a question that we could legitimately ask them to look into.

Do you want to comment?

DR. KIDDER: Yes. I think the question --

CHAIRPERSON WATSON: Give your name again for the record, please.

DR. KIDDER: Ray Kidder, Lawrence Livermore Lab.

I think what needs to be done is really pretty simple. What needs to be done is something which is different from what's happened in the past. What I mean by something is it doesn't have to be that the University of California assemble a group of its own physicists, for example, and look into this. It seems to me at the very least what would be required is for the University of California to at least officially say something ought to be done and make some recommendation. If that recommendation is that an appropriate committee of Congress look into the matter, so be it. That's fine.

The only thing that I've discovered in the past is that the University of California has been unwilling to make any official recommendation, however benign, in terms of its

own involvement in this issue. They, to use the familiar phrase, in my direct experience with them have simply swept this issue under the rug and have acted as though it didn't exist and have stayed completely silent about the whole issue.

So, I don't believe it's a question of getting the University heavily involved in matters which the Department of Energy is actually responsible for at all. It's to get the University of California on record as at least understanding that there is a big technical dispute going on between people like me and people like some of the other people at the labs and people like Garwin and Carson Mark here and so on and understand that this is an important issue and then make whatever recommendation the University thinks might be appropriate, which might be nothing more than writing a letter to some appropriate member of Congress and saying, hey, the University of California Advisory Committee has looked into this and we think something ought to be done. We recommend this.

ASSEMBLYMAN BATES: Maybe Vice President Frazer will speak to that when he comes up with the next panel.

So, it is possible for the University to do something like this or it is possible that the University requests that Congress do it to at least move this issue off dead center.

Could I hear from the representatives of the labs themselves? Would you support this kind of an effort?

DR. WHITE: We would certainly be happy to supply

whatever information and material might be useful to such a group.

ASSEMBLYMAN BATES: So, would you support it, yes or no? Would you say that this is a question that you feel needs to be looked at and that the University of California ought to proceed to recommend to the national policy leaders that they address this question of reliability?

DR. WHITE: I think that the question to the extent that there is scientific dispute about the judgments that have been made by the laboratories, we would welcome inquiry into those judgments.

ASSEMBLYMAN BATES: Is that a yes?

DR. WHITE: Certainly, the laboratories feel that they have made a qualified review of the positions and the technical positions that they have taken. We would be happy, as I say, in the spirit of scientific inquiry to explore those conclusions again with any body.

I would point out that without presuming to say what the committee might reach as its conclusions, the Scientific and Academic Advisory Committee has spent hours with the laboratories and I personally have spent time with them addressing this issue. Now, what it is that they would conclude about this issue, I cannot say in advance.

ASSEMBLYMAN BATES: But it is something that you say warrants debate and discussion and you would participate in that.

Well, then what is the problem? We've got the labs to do it and we've just got to get the University to take the

next step.

Can I ask a question of -- in the morning I addressed the question about verifiable. I was asking -- and one member spoke to that. I would like to hear from the labs about whether their view is that in fact we can have a verifiable Comprehensive Test Ban Treaty.

DR. BROWN: Earlier in this session I submitted a statement that was prepared by Dr. Jim Hannon of Livermore that addressed that issue.

ASSEMBLYMAN BATES: What is the answer?

DR. BROWN: The answer is long.

ASSEMBLYMAN BATES: Just yes or no. Just start with yes or no.

DR. BROWN: No. The answer is today --

ASSEMBLYMAN BATES: You don't believe it can be done.

DR. BROWN: I don't think it can be verified adequately to that --

ASSEMBLYMAN BATES: At what level --

DR. BROWN: We're talking about levels of a few kilotons.

ASSEMBLYMAN BATES: I don't know what that means.

DR. BROWN: Of explosive yield.

ASSEMBLYMAN BATES: What does a few kilotons mean?

DR. BROWN: What was the yield of the Hiroshima bomb? Thirteen kilotons. The order of -- the problems of a Comprehensive Test Ban are -- there's two aspects of the problem, detecting that an event has taken place and then

identifying it as to whether it's an earthquake or an explosion.

ASSEMBLYMAN BATES: So, you directly refute the testimony that was given here today. What about some scientific exploration of that question?

DR. BROWN: That is being explored. We have a very active research program at the Livermore Laboratory. There are some 40 people who are working fulltime in our verification research program; most of which is involved with seismic verification problems primarily of a Comprehensive Test Ban Treaty, but also of Threshold Test Ban Treaty matters.

ASSEMBLYMAN BATES: Could we argue that that group is a self-serving group? Could I hear from someone else after you're finished?

DR. BROWN: I do not believe that they are self-serving.

CHAIRPERSON WATSON: Who do you want to hear from?

ASSEMBLYMAN BATES: I don't care.

CHAIRPERSON WATSON: Okay.

DR. HOLDREN: This is Professor John Holdren. If I might make one addition to what Dr. Brown has just said.

Verification is never absolute. No arms control agreement will ever be perfectly verifiable. None ever has been. The judgment that Paul Brown was making when he says he thinks it would not be adequately verifiable at the present time is the judgment I make when I say in my view it would be adequately verifiable at the present time is a

judgment that is based on weighing the dangers of cheating below the threshold of detectability versus the dangers of not having an agreement. I think that is the correct comparison to make.

In my view the dangers of testing below the threshold of detectability, the number of tests that could be accomplished without a very serious chance of being detected, compared to the number that would be required to obtain some significant military event leaves me concluding that although, of course, it's not perfectly verifiable, it would be adequately verifiable.

But, again, you need to understand that reasonable people looking at the same technical data about verification can reach different judgments about what is adequate.

ASSEMBLYMAN BATES: What about on site?

DR. HOLDREN: On site contributes to your ability to verify. There's no question in my mind that the Soviets have become in the last several years much more forthcoming about the possibilities of on-site verification.

If we take them up on that and it turns out that they are sincere and accommodating with respect to on-site inspection, this will make the task of verification far easier.

It still could not be perfect. That is, even with the kinds of on-site agreements that you could imagine, there would be some probability that some kinds of tests under certain circumstances might escape detection. But the judgment of those of us who say it's adequately verifiable is

that the danger associated with those little leaks is very small compared to the danger of not having an agreement.

ASSEMBLYMAN BATES: Can I ask another question? It would seem to me that if certain energy is released at a certain level, you could pick that up. It would be a high magnitude in terms of the amount of energy that was released. So that at some point there might be an amount that could be -- explosion that could occur that would be difficult to determine whether or not it was an earthquake or some sort of -- I mean, it would be in the gray area. But it would have to be a relatively low yield, I would assume.

DR. HOLDREN: This is what the argument is about in a way with lots of expert testimony from seismology.

ASSEMBLYMAN BATES: Is that fairly accurate that the lower you get in terms of the amount of explosion, the amount --

DR. HOLDREN: The lower you get, the tougher verification is.

ASSEMBLYMAN BATES: It seems like the thrust and the drive is to try to get things that would be much more explosion -- I mean, you try to test for new types of things which would be the higher energy than the low levels. Because the low level, even though they're important, are not half as important as the other side of the equation.

DR. HOLDREN Unfortunately, many of the new types of things would not necessarily be more powerful in explosive yield. Their newness has to do with other kinds of differences. Therefore, we have had -- although not ratified

and observed -- a Threshold Test Ban Treaty at 150 kilotons. That is a yield about ten times that of the Hiroshima bomb.

It is quite conceivable that people could agree that a Threshold Test Ban at around the level of the Hiroshima bomb -- say 10 or 15 kilotons -- could be verified with very high assurance.

In my opinion that would not be enough. I believe that if we agree on a Threshold Test Ban Treaty with the Soviet Union, the rest of the world would rightly regard that as the major weapons powers fiddling with the rules in a way that continues to make it easier for them to play the game while others cannot. We could do a lot with testing below 10 kilotons.

DR. DeWITT: On the question about the Livermore seismic group. I know quite a few people at the Livermore seismic group and I also know very well seismologists outside the laboratories and outside the government. I'm friends with both. I must say I have a great respect for the Livermore seismic people. I think that they do an honest job and they are not self-serving in any sense. I speak as a self-proclaimed laboratory critic from inside. These are good people doing the best job they can.

In general, the laboratory seismic people would err on the conservative side; but they are forthright in saying that present seismological methods with adequate in-country seismometers can pick up explosions down to a fairly low level of a few kilotons with 90 percent probability. The figure is anywheres from, say, 5 to 10 kilotons.

Unfortunately, that yield still allows a fair amount of moderate nuclear weapons work if that were the choice of the treaty.

Seismologists outside the laboratory -- and we heard from Dr. Jack Evernden this morning in great detail -- maintain that in fact the yield is much lower than that -- down to 1 kiloton -- even with fully decoupled explosions. That is, explosions in a cavity using new techniques of high frequency seismic waves and in-country seismometers.

I think everything is moving in that direction. So that whether Livermore group accepts it or not, the convergence is toward the reliability being not a problem. That is, the level of detectability of underground nuclear tests and distinguishable earthquakes is down to the vicinity of 1 or 2 kilotons.

Now, this is well below what is needed to develop new strategic weapons. It wouldn't cut off developing tactical weapons and it wouldn't cut off doing research on these new directed energy weapons, at least some of them.

But, nevertheless, it might be a very important advance in stopping the present ongoing nuclear arms race; which is going to resume full blast when the Russians do their testing. I think that's enough.

CHAIRPERSON WATSON: I'm going to move us on to the third and last panel in respect for the rushing of time.

Let me ask those people who have not made presentations before to go first. So, I'm going to change the arrangement of the last panel. I'm going to ask Dr.

Josephine Stein to make her presentation first, followed by Dr. Harold Schwartz and Chrisopher Paine. Then we'll pick up with Dr. Frazer, Dr. Holdren, Dr. Mark and Dr. DeWitt.

I'm wondering if this panel will address a concern that I've had that's been running all day. That is the role as they see it of the University and the social responsibility and environmental conditions as a result of nuclear testing that's done in accordance with policy.

Dr. Josephine Stein, with the American Association for the Advancement of Science.

Dr. Stein.

DR. STEIN: Thank you very much, Senator Watson. I'm Josephine Anne Stein. I'm a Ph.D. in mechanical engineering from MIT. I'm presently in Washington as the Science and Arms Control National Security Fellow of the American Association of the Advancement of Science working in the office of Congressman George Brown from Southern California.

In my remarks I'm going to be covering some of the same territory as the previous speakers and I will be amplifying on some of the points that were raised earlier.

Ever since the Limited Test Ban Treaty was signed in 1963, a Comprehensive Test Ban has been an explicit policy objective of the United States. However, persistent and influential opposition to a CTB from Lawrence Livermore National Laboratory and Los Alamos National Laboratory has repeatedly blocked its implementation. As far as I can tell, the weapons laboratories managed by the University of

California are the primary source of technical information that is used to oppose a Comprehensive Test Ban Treaty.

Scientists associated with the weapons labs argue that, first of all, that CTB would prevent technical advances in weaponry and modernization of the nuclear arsenal; and secondly, that it would be possible for the Soviets to cheat under a CTB, gaining some military advantage.

Both of these lines of argument are specious. Preventing modernization of nuclear weapons is precisely what a CTB is intended to do in all of nuclear powers. The Soviets would be prevented from developing a whole class of more threatening weapons, as well as preventing further innovations on the part of the United States and other powers that could undermine our national security even further than it has been already by the proliferation of more advanced nuclear weapons.

A CTB is also viewed by non-nuclear states as essentially to preserving the non-proliferation regime. A CTB is in the national interest not only because it would freeze in an American technical advantage, it would also help freeze the membership of the nuclear club.

The other line of argument, that cheating by the Soviets would give them some military advantage, is wrong on two counts. First, as we've already heard today, technical monitoring capabilities are such that it is virtually impossible for the Soviets to conduct a series of nuclear weapons development tests without detection using seismic technology, as well as remote sensing and optical and radio

frequency. Disguising even one such test would be exceedingly difficult and not without risk of detection.

More importantly, however, is that no new type of nuclear weapon can provide a military advantage. Nuclear explosives are not militarily useful as battlefield weapons. Nuclear weapons are instruments of deterrence and deterrence only. Deterrence rests upon the possibility of nuclear retaliation, something that military planners must take with the utmost seriousness irregardless of the status of nuclear testing or the details of warhead design.

The laboratory scientists have used a parade of arguments against the Comprehensive Test Ban that range from misleading to preposterous to downright fallacious. In the mid-50's Dr. Edward Teller argued that the Soviets could cheat on a Comprehensive Test Ban by testing underground. He then performed such a test to prove the feasibility. The Atomic Energy Commission announced that the shock waves were felt no further than 250 miles away, when in fact a seismic station in Alaska recorded a blast 2,300 miles away. The Commission, when asked to explain this, said that they had made an inadvertent error.

Dr. Teller and his colleague, Dr. Latter, next proposed that the Soviets could muffle explosions underground in large cavities. As testimony to the influence of such arguments, Dr. George Kistiakowsky, who was the science advisor to President Eisenhower, said:

> "I am now convinced that a comprehensive treaty would not be

ratified by the Senate since AEC, DOE and Teller will all testify in opposition."

But, in any event, modern seismic techniques using high-frequency filtration and noise reduction techniques with in-country monitoring stations could detect Soviet explosions, even if decoupled, as small as one kiloton anywhere in the Soviet Union.

In 1957 President Eisenhower said at a press conference that Teller had promised him a clean hydrogen bomb that could be made available in four to five years. "If you use this on the battlefield," said the President, "there will be no fallout." Needless to say, the President was mistaken. It is impossible to make nuclear bombs without nuclear fallout.

As has been much discussed, in May of 1978 President Carter was advised by the directors of the weapons laboratories against a CTB. There was testimony before the House Armed Services Committee, there were letters sent to members of Congress and there was no CTB.

The arguments were made that a stockpile could not be maintained reliably. I'd like to borrow from an argument by Dr. Garwin, who was here this morning. He said you need to look at the reliability argument in context.

I would like to see the weapons labs prepare some facts for us comparing the reliability of the warheads to the reliability of the delivery vehicles in which they are mounted. I think that when you make that comparison, you

will see that reliability is really dominated by the delivery vehicles rather than the warheads themselves.

The arguments against CTB get progressively more outlandish. CTB opponents claim that the Soviets could disguise the seismic signals from an underground nuclear explosion in the coda of a large earthquake.

The logistical problems with such an evasion scheme are formidable, requiring in essence that the bomb be placed ahead of time very near the earthquake epicenter ready to go off at a moment's notice. Even so, the seismic signatures of an earthquake and an underground explosion are distinctive. So that there would still be some risk of detection.

CTB opponents have suggested that the Soviets can cheat by hiding nuclear explosions behind the sun. What will they think of next? Testing behind Uranus? Testing inside erupting volcanoes? The truth is there is no place where one can confidently hide a nuclear explosion.

There is no reasonable argument against a CTB in my opinion, scientific or otherwise. Examination of the record of opposition to the CTB from scientists leads to two inescapable conclusions: That the weapons laboratories scientists have been the primary source of technical information, the primary obstacle to a CTB; and two, that the weapons labs appear to be putting their own self-interest ahead of the national security considerations that underlie the U.S. policy to achieve a CTB.

The Strategic Defense Initiative has breathed new life into the weapons laboratories and scientists are hard at

work on a new third generation of nuclear weapons. But they're not just working on defensive nuclear weapons. They're also working on defense suppression for techniques which would penetrate a nuclear defense that would be put up by the Soviet Union. They're working on a cycle of offensive/defensive measures and countermeasures that guarantee an endless arms race with or without the participation of the Soviets.

The situation we are faced with arises from the contradictory assignments of the weapons laboratories. On the one hand, as national laboratories, Livermore and Los Alamos are to be responsive to national security needs and the national interest. On the other hand, the laboratories were chartered and continue to be charged with the responsibility of nuclear weapons research and development, which necessarily includes nuclear testing. These two missions are in fundamental conflict.

Out of long-time habit and lack of imagination, the weapons laboratories rationalize their continued involvment in nuclear weapons R&D and use their considerable influence to lobby against the CTB. The situation is analogous to having parents give children an allowance to teach them how to handle money once they are financially independent and then permitting the children to decide when they are ready to have their allowance cut off.

The State of California and the Regents of the University of California should, as a matter of policy, terminate the nuclear weapons R&D progress at Lawrence

Livermore and Los Alamos National Laboratories. At the same time the State of California should assist the laboratories in a transition to other scientific work -- advanced research in astrophysics, meteorology, space exploration, material research, energy research, biomedical engineering. The list goes on.

Once the mission of the laboratories is redefined, then the primary source of opposition to a Comprehensive Test Ban goes away, national policy to have such a Comprehensive Test Ban can be implemented, between one and two billion dollars that is spent annually on nuclear R&D can be reallocated by the federal government to other programs that the laboratories would be eligible to compete for. The laboratories would then be brought into conformance with what's appropriate for a great university -- open inquiry and dissemination of knowledge. Thank you very much.

CHAIRPERSON WATSON: Thank you very much, Dr. Stein.

Dr. Schwartz, Charles Schwartz, University of California, Berkeley.

DR. SCHWARTZ: Thank you very much. My name is Charles Schwartz and I'm a Professor of Physics at the University of California, Berkeley.

I have been for quite a number of years an active and persistent critic of the Livermore and Los Alamos Laboratories and particularly of the University's role in the relations of those labs. In a word and a half I can summarize my objection by saying that the University performs a disservice to the nation by its engagement with those

laboratories. Not a service, a disservice, a deception, a confusion.

It gives to the laboratory managers and their close associates in Washington, whose mission is the continuation of the arms race, the appearance of broad-minded, diverse balance and objective and valid technical opinions on these questions to help guide the nations.

This is a deception that is granted simply by the existence of the name University of California and by the absence of any real balanced oversight, diversity, input into the labs' work and their communications, which are frequent and intense, with the decisionmakers in Washington.

This morning Dr. Jack Evernden said that UC has failed in its oversight responsibilities with the laboratory. I'd like to say he's wrong. The question is what are the oversight responsibilities of the laboratory. I'd like to show you a bit of documentation on this which I think will be very revealing.

In 1979 there was intense debate on these subjects around the Board of Regents, both on the Board and from protest activities outside. I was engaged in all of those things. There were proposals before the Board of Regents for the establishment of a new, independent and diverse oversight body that could help achieve the kinds of balanced approach and assessment of weapons problems that we have heard talked about today.

But there was also a countermove from Washington. The Secretary of Energy appointed a special commission to

study this problem. The commission was made up of old weapons labs directors, from defense and university officials, people who were quite familiar members of the status quo who were not really interested in any change.

Their major recommendation was that the University's involvement with the lab should continue and that, quote, "The major need of the laboratories is an effective group to discharge the trusteeship functions." What was meant by this was spelled out in a statement to the Board of Regents in May 1974; statment made by Duane Sewell, Assistant Secretary for Defense Programs for the Department of Energy. Let me read his quote carefully for you:

> "As I see it, this means that the trusteeship group .." that means the Regents and that committee and the oversight. "... the trusteeship group will have to hold more meetings at the laboratories and elsewhere than has been the case in the immediate past, and certainly more homework will have to be done by the members of this group to become familiar with the laboratories' programs and administrative problems. I am sure that this group will also be called upon to make more public statements supporting the laboratories and

their programs."

I think that spells out very clearly the mission of oversight offered to the Regents by the Department of Energy. By the way, Duane Sewell, who delivered this advice on behalf of the Department of Energy, was only a few months earlier the second-in-command official at the Livermore Lab, where his whole history career had been.

There are many examples, as Dewitt stated earlier, of people from the lab working up. By the way, the labs are a completely ingrown organization. People come there for technical reasons. If they perform well, they may be promoted. All the top management of the laboratories are people who have had their whole careers there. Many of them go to important offices in Washington where policy decisions are made to direct the labs' programs and to give recommendations and advice to the level of Secretary of Defense, National Security Council and so on.

So, the labs are indeed intimately integrated with much more than technical work, but the whole framework of national policy with regard to nuclear weapons in view of that mission given to the University of California to do their homework and to be called upon to make more statements supporting the laboratories and their programs. No critique, no balanced assessment, no objectivity, no diversity, just support.

Well, the Regents had a choice whether to go with the proposals for a reformed and broadened version or this one. The Regents chose this one.

Then the committee, this SAAC, that they set up was just a revamping of a previous committee and its mission has been clear to maintain status quo. The people on that comittee are overwhelmingly members of the old club who know how the labs work, are sympathetic to that and want to maintain it.

I should point out that while the discussions here have been almost exclusively around the politics by the labs around the CTB issues, there are a number of other examples. In repeated presentations before the Board of Regents I and others have brought these up in documents and testimony to the Board just a year ago September. I listed some of these in detail. The first significant one that I had discovered -- and by the way, all of my information comes from public sources. I am not an insider with access to the secret works of the labs. So, I know what happens to leak out in public -- was admissions by Los Alamos Director Agnew concerning the history of the neutron bomb in which he said that there was some difficulty in the early 70's there getting this new idea for a new kind of weapon accepted in the Pentagon. But Agnew told in certain congressional hearings, he said:

> "We at Los Alamos have a small, but very elite group that meets with outside people in the defense community and in the various think tanks. They are working very aggressivly, trying to influence

the Department of Defense to consider using these weapons ..." and so forth.

Other examples -- and these are more recent. And I think there has been an increase in both the overt -- well, overt is all I can see. I can't tell you about the covert political actions of the lab. I think the position taken by the Regents has endorsed and encouraged more such. During the nuclear freeze campaign the laboratory was very active in training and encouraging its employees to get out there and engage in public debate. Of course, we have also, I think, very clearly heard about the role of the laboratory officials in pushing the SDI program.

So, this is a structural situation which should not surprise anyone, as earlier people said. The labs have a mission. The people who go there take on the career, a profession, a pursuit of weapons development and it's just inconceivable that that is something that they will be party to ending or decreasing.

So, consistently arguing against arms control limitations, consistently advocating in favor of new weapons is the natural and to be expected role.

The question of diversity has been brought up explaining that University management provides greater diversity at the labs than could exist under other management. I think there probably is an effect there, but the effect is tiny to the vanishing point. There is very little diversity at the labs.

If you were to take a sample -- and there's one that can document this by some data that's available -- about the spectrum of opinion among informed people at the labs about nuclear weapons policies, you would get a certain diversity, a certain spread. If you were to do a similiar measurement, say, among the faculty members at the University of California who are knowledgeable about this, you would get another spread. But the University spread would be out here (indicating) and the lab spread would be about here (indicating). Nothing at all congruent between these two distributions.

Dr. DeWitt over here is an absolutely unique phenomenon at the laboratory by being a active dissident. He is one. Dr. Kidder, I would say, is half a dissident. One and a half dissidents out of a staff of several thousand is not a very good track record for the University of California to proclaim as its success rate in promoting diversity, freedom of expression. I think it is a measure of incredible failure. It is a failure consciously achieved through decisions by the Board of Regents in the presence of the arguments that have been presented here and have been presented to them in the past.

I, therefore, think it is false to imagine that improvements are likely to be made from within by the Regents or by slightly improved performance by the Scientific Advisory Committee that was mentioned by a previous speaker.

I think there is a fundamental and essential opportunity and need for the members of the Legislature to

find steps that they can take. A concept has been talked about of a truly independent review body that might be established in some way by this Legislature; a body that would be composed of well-established, knowledgeable people truly representing diverse points of view and background and levels of assessment on these questions which are of incredible importance.

I think it is a responsibility of the Legislature to do this, because the University of California belongs to the people of this state. I think the Regents have failed -- one might even say betrayed -- their public trust in having sold out to the weapons fleet. The Legislature is called upon -- I call upon the Legislature to do what they can to achieve some balance, rectify it, take some initiative on their own, step into the fray. I think there's every bit of reason and I think you have the ability to do that. I ask you to take that step.

CHAIRPERSON WATSON: Thank you for the invitation.

I'd like to call on now Christopher Paine, the Center for International Studies at MIT.

MR. PAINE: Thank you, Senator Watson and members of the Committee. I'm a visiting fellow at the Center of International Studies, working on nuclear testing issues. That's at Massachusetts Institute of Technology. I've also worked on Capitol Hill for the past seven years as a lobbyist for scientific organizations interested in the arms race and as a congressional staff member, first in the House of Representatives and then in the Senate, concerned with atomic

energy defense activities.

I welcome this opportunity to present my views on the role of nuclear weapons laboratories in the policy debate over the nuclear test ban and to review the question whether the University of California has wisely exercised its management responsibilities in this sensitive area.

Scientists who venture into the public policy arena have a special responsibility. They must assure that the instinctive deference that is accorded their unique base of nuclear knowledge does not become a license to undercut or manipulate the normal decisionmaking processes of our democratic institutions. This caution especially applies to the officials of UC's nuclear weapons laboratories, whose purported base of expertise is not only highly specialized, but largely secret.

How well has UC management done in assuring that its laboratory employees adhere to this essential criterion for scientists in the public arena? On the basis of a thorough acquaintance with the record of the test ban debate since 1957 and with firsthand experience of these matters on Capitol Hill since 1979, I must tell you that, with certain notable exceptions, the record of laboratory officials in this respect has been deplorable; especially in recent years.

In general, laboratory officials have not confined themselves to their statutory role as custodians of the classified knowledge and expertise which supports deployment of a nuclear deterrent by the United States. Instead they have arrogated to themselves the task of defining which

nuclear forces and arms control approaches are appropriate goals for U.S. policy. In my view they have then abused their secret base of knowledge by constructing a kind of technical fait d'accompli to steer public policy toward their preferred objective of an endless technical competition in nuclear arms.

The unwary politician or policymaker -- and I've known a lot of them -- faced with the spectre of decaying warheads and a threatened mass exodus from the laboratories may understandably fail to recognize that the entire structure of the lab argument against a test ban is based on prior and current design and maintenance practices for the nuclear stockpile. These practices can and would be changed under a test ban regime.

Moreover, most of these practices were developed to provide the very military characteristics of a nuclear war fighting capability that are at the center of the policy debate over the test ban. Thus the labs' apparently well-reasoned technical argument against the test ban is embarrasingly circular. It's somewhat akin to arguing that a ban on the heroin trade should be done on the grounds that the poppy farmers will go bankrupt. It doesn't make sense.

It should be readily apparent from the preceding testimony heard today that the real public policy choice is not between a reliable deterrent and an unreliable one or between unrestrained future testing and inevitable nuclear amnesia or between a robust nuclear force or none at all. The actual range of policy options is much broader than this

and I believe the proper role of the nuclear weapons laboratories is to elucidate, to clarify the technical requirements posed by each of these policy options. It is not their role to chose pre-emptively between them and then to defend their choice based on their interpretation of a largely classified data base which they control.

If the system were working properly, the lab directors would not take it upon themselves to declare U.S. treaty commitments obsolete. And I am submitting for the record a rather extensive compilation of what the laboratory directors have said in Washington over the last five years concerning nuclear testing issues. They have unilaterally taken it upon themselves to declare before congressional committees that U.S. treaty commitments regarding nuclear testing should be made obsolete, should be forgotten and dispensed with. They did this even as the President of the United States was attempting to negotiate a Comprehensive Test Ban. I consider that conduct reprehensible.

Instead the laboratory directors would present disinterested, careful analyses for legislators and policymakers of what information will be generated; as well as what information would be denied by test practices geared to the full range of policy options, ranging from zero yield and zero tests to the status quo at 150 kilotons.

If laboratory officials are as deeply concerned as they claim to be about the alleged inconsistency of U.S. diplomatic goals with the military requirements of deterrence as they perceive them, then in the course of these analyses

they should point out these inconsistencies and suggest modifications either to the military requirements or to the proposed test restrictions to accommodate these inconsistencies.

As matters now stand, the chief contribution of the present laboratory leadership to the public policy debate over nuclear testing has been to obscure the real nature of the choices available and to obstruct the formation of a political consensus supporting a very low-yield threshold ban.

This role, of course, is just the opposite of what the American people are entitled to expect from the leaders of the national laboratories. Their technical expertise should be used to clarify public policy choices regarding science, energy and national security and used to facilitate the process of decisionmaking by those legally entrusted with the responsibility for national security policy.

National laboratory representatives should not make pronouncements in their official capacity on matters which are clearly beyond their sphere of competence and responsibility such as the, quote, "requirements of deterrence"; the psychology and motivation of Soviet leaders; the alleged obsolescence of U.S. treaty commitments; the proclivity of Soviet scientists to cheat; the political will of future Congresses to provide adequate funds in a test ban environment; the overall goals of U.S. national security strategy; and the, quote, "verifiability of a comprehensive ban". In my view these are all subjects which are beyond the

competence and responsibility of the directors of the nuclear weapons laboratories.

A moratorium on pronouncements regarding CTB verification would be especially welcomed. Neither the laboratories nor anyone else has advanced an agreed definition of what a comprehensive ban would be in practice and to my knowledge a comprehensive verification analysis incorporating all intelligence assets of the United States government and its allies has never been conducted. We simply do not know what the relevant overall probabilities of detection are for such a, quote, "comprehensive agreement".

Unfortunately, this ignorance has never deterred laboratory spokesmen from advertising the infeasibility of a comprehensive agreement. The word "comprehensive", by the way, means in all environments. It is not foreordained that a CTB must cover all explosive releases of nuclear energy, which can be quite small.

A test ban which reduced the yield of allowable nuclear explosions to some modest multiple of the largest military chemical explosives would, in my view, fulfill the intent of the CTB as a prohibition on the further development of weapons of mass destruction.

Proper management would also assure that laboratory personnel do not selectively invoke the classified record of past nuclear design and test practices as prima facie evidence that such practices are necessarily required in the future to correct deficiencies in the nuclear stockpile.

On the other hand, the national laboratory

representatives should analyze the full range of proposed test restrictions for their impact on present and planned military requirements for the nuclear stockpile. They should analyze for each proposed testing regime which military requirements could and could not be met within the constraints of that regime. They should explore and document optimum alternative test, design and maintenance practices for each proposed test ban regime that would maximize stockpile confidence and shelf life within the limits imposed by that regime. They should analyze the results of their prior analyses for their sensitivity to various effective dates for a test ban.

Unfortunately, U.C.'s management of the nuclear weapons laboratories has led to a rather uncomfortable situation. Either the lab directors are distorting the facts about the alleged inability of the present stockpile to be maintained under a CTB or they and their predecessors have conciously pursued nuclear design practices which directly undercut longstanding U.S. diplomatic commitments.

In either case, as President Carter discovered when he tried to negotiate a test ban, the result is intolerable from the perspective of formulating public policy.

A top-to-bottom, completely independent outside review of the laboratories' nuclear design, test and stockpile surveillance programs should be instituted immediately with the aim of restoring the competence and willingness of laboratory leadership to provide objective, accurate analyses of stockpile evaluation and maintenance

techniques under the full range of policy alternatives. Not just their preferred alternatives, the full range of alternatives; including a test ban which precluded all explosions that could not be contained in a reusable above-ground facility and observed by personnel within 30 meters and including test bans with thresholds of, say, 300 tons, 1 kiloton, 3 to 5 kilotons and 10 to 15 kilotons.

If we had such analyses, it would be much easier for politicians and the Executive Branch to formulate and agree to a consensus on nuclear test ban policies.

Second, guidelines should be developed similar to those governing the interaction of the intelligence community with the policymaking branches of government. These would necessarily be informal guidelines as long as the laboratories stay under the aegis of the University of California. No one has any desire to restrict individual's freedom of speech. However, these guidelines should emphasize the difference between analysis that is within the laboratories' sphere of competence and questions of overall national policy determination that are properly within the sphere of the Executive Branch and the Congress. The legitimate purpose of the national laboratories is to serve these democratic institutions; not to sidestep, circumvent or outwit them.

A system of management incentives should be instituted whereby laboratory employees are no longer rewarded for their talents at misleading the Congress, undercutting the President and protecting those elements of

our society with ideological and career investments in the nuclear arms race.

The national laboratories are in theory national assets. The taxes of all Americans go to support them. The work they do should serve to illuminate the full range of nuclear weapons policy options facing the American people; not just the options favored by those with vested interests in the design, development and production of improved nuclear weaponry.

I believe that an unimpeded channel, independent of the Division of Military Application and its associated units within the laboratories, must be created for the analysis and transmission of objective nuclear stockpile information to decisionmakers within the Executive Branch and to the legislative branches of government.

If UC management proves incapable or unwilling to bring about these minimal reforms, restoring some measure of scientific credibility to the laboratories' presentation of test ban issues, then it should divest itself of the management contract and remove the figleaf of intellectual respectability which it currently extends over the laboratories' activities. Thank you.

CHAIRPERSON WATSON: Thank you so much, Mr. Paine.

Dr. William R. Frazer.

DR. FRAZER: Let me very briefly describe to you the means by which the University of California carries out its contractual responsibilities. I'll describe not only the management structure, but also the means we have of carrying

out the oversight function.

The Regents are directly involved in such matters as the appointment of high-level personnel, selection of directors, top-level salary administration, et cetera.

There is a Regental Committee on Oversight of the Department of Energy laboratories that currently consists of 12 Regents. The Committee visits each laboratory once a year. The President and I participate in these visits. The Committee's function is to become highly informed on major issues affecting the laboratories and to lend its considerable expertise when appropriate and to act as a source of information to the full board.

The University is assisted in discharging its oversight responsibility by the use of expert, independent and broadly constituted advisory committees appointed by and reporting to the President. Two standing committees are currently in operation. Let me describe them to you briefly. You've heard about one of them already, the Scientific and Academic Advisory Committee.

This committee, established in 1971, has oversight responsibility to the Los Alamos Laboratory and the Livermore Laboratory. Its role is to provide expert evaluation and render advice on any and all topics that affect the quality of the laboratories' performance. I've attached the charge of the committee and a list of its members in my formal testimony. I think you'll see it's a very distinguished group of Committee members.

The committee meets four times a year, twice at each

laboratory. Typically, the meetings focus on a specific component of the laboratories' program and examine it in-depth. Again, moving a little rapidly here. The agenda for this committee is prepared by myself in consultation -- by the committee chairman in consultation with me and with the advice of the laboratory directors.

That committee, as you've just heard earlier today from Dr. Kidder, is now in the process of responding to my request made several months ago that they examine the issue that is of such interest to this Committee, the use of nuclear tests by the laboratories in their nuclear weapons program and the relationship of these tests to a Comprehensive Test Ban. That committee's independence, broad expertise and access to classified information are essential qualities for this important task.

There's a second committee that I'll just refer to briefly, the Health, Safety and Environment Advisory Committee. I think the name of that is probably self-explanatory. I won't say any more about it.

Let me just make then a concluding remark or two based on listening to all the testimony you've heard today.

I think you're well aware, having heard the testimony now, of the complexity of the issues you're dealing with here. I think you're well aware of the spectrum of opinion and not just between the University representatives and the others, but the very wide spectrum of opinions and blendings and subtleties from one to another of the witnesses you've heard; a very distinguished group of witnesses,

indeed.

I would like to just comment on two issues that have been raised: Is the University's management of the laboratories serving the public interest? There's disagreement on that. I would like to just point out two things you've heard in the hearing today that are relevant to that, two instances in which I think you heard about ways in which the University's management is performing a useful service.

Dr. Evernden's testimony this morning pointed out the recent testimony of Directors Batzel and Hecker before a Senate committee dealing with the question of ratification of a Limited Threshold Test Ban Treaty. They testified that there is no evidence that the Soviet Union has been cheating on that treaty. This is in contradiction to the stated view of the administration in Washington, particularly the Defense Department.

Obviously, I think it's quite obvious that the degree of insulation which the University of California's management of the laboratories provides has been helpful in that instance. And I would remind you of Dr. Kidder's remark, which I might interpret -- broaden it a little bit. If the University of California were not managing the laboratories, you would not be holding this hearing.

Could our oversight function be improved? It has evolved a great deal since the early days of Los Alamos when the University's contract was really an umbrella to provide a buffer, you might say, between Washington and the

laboratories. Over the years the University's oversight role has become more and more active, more and more thorough. It has evolved considerably in the past few years. As I said, just this year, just a few months ago, I've commissioned the SAAC Committee to examine many of the questions you're looking at today.

Could that oversight role be improved? Could we do better? Of course we could. It's like asking could our oversight role of the campuses be improved. Of course we could improve. We're not perfect and I have every intention of assuring you that we take this oversight role very seriously and will attempt to exercise it and do attempt to exercise it to the best of our ability. Thank you.

CHAIRPERSON WATSON: Thank you, Dr. Frazer.

Dr. Holdren.

DR. HOLDREN: Yes, I'm still John Holdren. I will now tackle the second issue on the agenda, which is the University's role in the management of the laboratories.

It seems to me that one needs to ask two questions. One is whether that management relationship has been in the University's interest; and the second question is whether it has been in the public's interest.

As far as the University's interests are concerned, of course one addresses the University's main missions; which are teaching, research and service. One thinks first of the two missions, teaching and research, which are in some sense unique in their combination to the University itself, the question of the University's role in the creation and

dissemination of knowledge.

There, although I myself as a University professor and former lab staff member have benefited from some of the kinds of interactions that occur, I have to say that the benefits in this connection are modest. They are not insignificant, but they are also not enormous and most of them could be maintained no matter who is managing the lab. That is, the constructive relationships between the University of California campuses and the laboratories are mainly based on some areas of mutual interest, access to resources of mutual benefit and proximity. Those kinds of relationships exist in many other instances where the University itself does not manage the organization in question.

As far as service is concerned, this really comes down to the key and larger issue of the public interest. That is, as has already been suggested here, we can only conclude that the University is performing a public service by its management role in the laboratories if we find that the operation of those laboratories under University management has itself been in the public interest.

Now, again, as somebody with experience both from the University side and the lab side, I do see some aspects of the University's management role which I believe have been in the public interest. I don't think the issue is all black and white one way or the other. I think it is true that University management in name at least has helped to maintain a high professional caliber in the laboratory staffs,

although I have to say I do not think that the University is the only organization in our society capable of helping the labs maintain the needed level of technical competence.

I think it is true that the University's management has helped insulate the laboratories from micromanagement by the Department of Energy; although, again, I would not concede that the University is the only manager capable of accomplishing that goal.

I think it is true that the University's management has helped create at least a degree of toleration of dissent in the laboratories, which has been a desirable thing; although there aren't enough Hugh DeWitts, there aren't enough Ray Kidders. Nevertheless, it is important that the degree of tolerance which has permitted them to exist there and to object to official positions has been a desirable thing.

But I do not think these advantages, although they are significant, are sufficiently weighty to overwhelm the very strong argument against the effectiveness of the University's role. That argument, as has already been mentioned here, is that the University in its role as a more or less absentee manager of the laboratory creates an impression of a degree of critical scrutiny, a degree of oversight, a degree of guidance, a degree of academic respectability in some sense; an impression which is really not justified by the nature of the relationship.

It is true there is and has been an oversight committee. It is true there are visits. But I think if one

looks carefully at the nature of the laboratories and the nature of the Department of Energy, whose interest the laboratories by their nature must serve, and the nature of the University, it simply is unreasonable in principle to suppose that the University is going to be able to exercise ever the kind of real management, the kind of steering, the kind of oversight, the kind of critical scrutiny that I think the University and the public conscious would require if we were to be happy with this arrangement in which the University serves as the custodian of this contract.

Again, I come back to the point that I made in my earlier remarks. We have to face up to the possibility that the laboratories have been engaged for a long time in what has been called suboptimization by the economist Kenneth Boulding, meaning they have been finding the best ways to do what ought not to be done at all. That is, to devise new forms of nuclear weapons that would somehow appear to be more militarily usable and in fact thereby have contributed to driving a nuclear arms race which has been making us less safe.

The University, by its custodial and pro forma management relationship with the laboratories, is helping to sustain the respectability of the proposition that our national security requires the application of the best technical talent to continuing innovation in nuclear weaponry. I think that proposition is wrong, that that proposition has been driving the nuclear arms race in pernicious directions and that the University cannot be proud

of its role in sustaining this illusion that this is what our national security requires by its custodial relationship.

I do think that we need in this country a nuclear weapons establishment. I think we need it for unfortunate reasons. We would need it even if we achieved a Comprehensive Test Ban as an insurance policy.

So, I am not arguing that the United States can at the present state of the world do completely without a nuclear weapons design establishment; but I do not believe that we need two nuclear weapons laboratories competing with each other. I think one would suffice. I don't think we need the prestige of the University of California put at the surface of the nuclear weapons establishment and put at its surface in particular in arguing politically that the continuation of the nuclear arms race is what is necessary to maintain the national security of the United States.

I think that is where we go wrong. That is where the State of California has a real interest in this matter. That is, whether the prestige and the expertise of the University of California in this instance is being put to good use. My conclusion on balance is that it has not been.

Again, I emphasize from the standpoint of someone who's worked at the lab, I see very attractive aspects of the University management. It makes the lab a better, more attractive place to work. From the standpoint of permitting some tolerance of dissent, the management has been a good thing. But those advantages, in my view, cannot compensate for the fundamental problem that the University is lending

its respectablity, its prestige and an impression of oversight to an operation where none of those things are in fact justified. Thank you.

CHAIRPERSON WATSON: Thank you, Dr. Holdren.

Dr. Carson Mark.

DR. MARK: Madam Chairwoman, I don't think I will take very long nor introduce anything particularly new.

I said before and other people have said that the labs are in their operation observing what they are told to be national policy priorities. They have in that connection made statements about the negative effects of a Comprehensive Test Ban which have either been on false bases or poorly explained bases and for that I think criticism is most certainly due.

The other thing which applies here and which I am sure you realize, although I haven't had it in my own sight for very long, is the inclination they have to proceed as they do is the assumption -- the absolutely basic ingrained assumption -- that the United States and the USSR are necessarily engaged indefinitely in a competitive all-out arms race. If you make that assumption, then the things which they have been doing can more easily be understood.

There is no allowance when they talk about the terrible effects on their laboratory of a test ban; no allowance for the fact that if you had a test ban, some of these political climate features and some of that assumption would radically change and what the labs might be doing in the country's interest would become a different set of

activities.

They say we can't make new weapons if we have a test ban. Quite correct. If you have a test ban, you don't need to make new weapons. So, things will be very different.

The other last thing I would leave with some of your colleagues is one gets the feeling that this is a matter of desperate importance and has to be settled during this Congress, if not before, and things of that kind. I would just like to mention that of the 25 or 30,000 weapons in the U.S., more than 50 percent are more than 20 years old. So, the deterioration which we hear so much about and the sudden collapse of all our security isn't really so strongly underlined by that fact. I will leave it there.

CHAIRPERSON WATSON: Thank you, Dr. Mark.

Finally, Dr. DeWitt.

DR. DeWITT: Again, I am Hugh DeWitt, 30-year staff member of the Livermore Laboratory. Other people here have identified me as a full dissident, which I rather enjoy. So, I will continue that role and make a, hopefully, very short discussion of the oversight role of the University of California of the weapons laboratories and, specifically, the oversight bodies that have been set up, institutional arrangements, from earlier committees.

I first want to mention that in 1978, after nearly a year of very stormy hearings before a high-level committee chaired by Vice Chancellor William Gerberding -- a committee appointed by, I believe, the UC president at that time -- to examine the relations between the weapons laboratories and

the University of California.

This committee issued a report, the Gerberding Report, which concluded that it was still all right for the University to run the two weapons laboratories so long as that management was morally and intellectually responsible. Then it went on to discuss various kinds of new oversight arrangements.

I have to agree with Professor Schwartz that the main kind of oversight arrangement was simply more frequent visits to the laboratories to see what was going on and not much else. In fact, in my opinion, as an insider and watching all this and having testified before that group, really nothing has changed since 1978; that the management of UC remains as sensitive, weak and as tenuous as it always has been.

Now, the weapons labs are managed by the UC Regents under five-year renewable contracts with the Department of Energy. Currently, the UC Regents have approved the renewal last September and we're waiting on the Department of Energy to see if they will renew the contract when it runs out this coming September.

The labs are owned by the federal government, all money comes from congressional appropriation. So, the University role is really quite limited. The Regents make some attempt. They have a special oversight committee for the DOE laboratories and the Regents do indeed come to the laboratories, both of them, once in awhile every year or so and they hear nice prepared presentations in the director's

office.

But since the Regents are generally not technical people, they can't judge the technical and scientific arguments used by the lab managers to justify important matters like the current nuclear weapons testing and design policies.

Now, the Regents know very well this requires some scientists and requires close attention by a group of qualified scientists. In principle, this kind of effort could be done by another group that's been discussed by many of the earlier speakers, the UC Scientific and Academic Advisory Committee for Livermore and Los Alamos. This group was created by the Zinner Report of 1971, another one of these big review committees way, way back.

The Scientific Advisory Committee is the only entity in the UC system that has any possibility of exercising an independent assessment of the technical aspects of nuclear design work -- particularly policy -- of the two laboratories.

Now, over the years this advisory committee has included some very competent people; but it really has not exercised any kind of a really independent critique of the programs of the laboratories. At least not over nuclear weapons.

I worked with the Statements Committee from the years 1976 to 1982 and read all the reports and I had general hope that they would do something. In fact, they've done very little. Ray Kidder mentioned that in 1977 he presented

a very important statement asking the Committee to look into the technical questions about nuclear weapons reliability, which was ignored. I was there and can testify he was ignored.

In 1982 the whole thing was brought up again rather carefully and with a lot of correspondence to the UC President, David Saxon, and we were told that this kind of question, nuclear weapons design policy, was simply too hot to handle. It was a technical question, yes; but the UC Advisory Committee simply was not going to deal with it and the matter was dropped that year.

Now, I'm very encouraged that apparently it's being brought up again this year rather seriously and I think something will happen. So, I mute my criticism; because I expect that there will be an honest critique coming out of the Advisory Committee later this year.

But the point is that up until now the function of the Advisory Committee has been to look at the peripheral issues, primarily scientific research at the laboratories. Some of this research, by the way, is very good and very appropriate and I approve of it and I support it. I even try to do it, some of it.

But by and large the record of the Scientific Advisory Committee has been basically to put a stamp of status quo onto the laboratories and not exercise any kind of real oversight management function.

So, I have to conclude that the UC management of the weapons laboratory in the sense of the Gerberding Report has

failed to be morally and intellectually responsible in the sense asked for. It's possible the task is really not possible. But I think the University could do a lot better.

As I've said before, I believe it's imperative that there be some body, some group of independent scientists with access to all classified information so there's no classified information barriers, no secrecy barriers to look into weapons design policy, examine the arguments given by lab spokesmen as to why nuclear testing should continue indefinitely; which is, of course, the position that the laboratories maintain. These arguments should be assessed and brought to the attention of the U.S. Congress.

If the Scientific Advisory Committee really can't do it, then I hope that Congress can find some other group that can. But at least at the present time the Scientific Advisory Committee has a chance and I believe is trying hard to do just that, make an official attempt to assess these arguments that we've been discussing here all today.

Now, as one quick final point. As I've been claimed as a fulltime dissident or one complete dissident, I want to say that in recent years the Livermore Laboratory, where I'm still employed, presumably in good standing, has a good record in allowing internal criticism and dissent such as I've been expressing. I've done a great deal of writing and publishing articles in respectable magazines and major newspapers, given testimony to Congress and working with the press and I do my best to give my opinions also directly to lab management so they know what I'm doing so there's no

surprises. There's been no attempt to suppress what I'm doing or to in any way threaten me.

Obviously, my opinions are strongly different from those expressed by most of the lab hierarchy and there are very few of us who express these dissident opinions. But I believe that it's appropriate there be some people in the laboratory who do this. The freedom to express dissenting opinions by lab staff members in fact is quite good. So, I give the lab good marks at least in the present decade for this situation. Now, this is one good consequence of the UC management of the Livermore Laboratory.

On balance at the present time I do have to publically say that I support continued UC management of the laboratories and disagree with some of my colleagues here. But, as I said earlier, I think that the management has been very weak, very tenuous and in fact the University has really failed to do much about it and I would hope to see some very serious improvements.

I guess I'll stop there.

CHAIRPERSON WATSON: Let my see if there are comments or questions.

Senator Rosenthal?

SENATOR ROSENTHAL: No.

CHAIRPERSON WATSON: Assemblyman Bates?

ASSEMBLYMAN BATES: Yeah, I had some. I'm sorry.

Vice President Frazer, I asked the question earlier when you were in the audience and I'd like you to respond to the question about the University giving some leadership on

the question of reliability.

DR. FRAZER: That I was attempting to answer in my comment that I had asked the Scientific and Academic Advisory Committee several months ago to make that their primary agenda item this year. And they're doing that.

ASSEMBLYMAN BATES: Would you consider raising that with Congress, saying that this is an important issue that we're investigating and would suggest that the Congress might even want to look at this in a broader grouping?

DR. FRAZER: I don't know what the outcome of that committee's report will be.

ASSEMBLYMAN BATES: This is an in-house situation and the question has been raised it might be better even from a broader national discussion and it would be important for the University to provide some leadership in that.

DR. FRAZER: Well, it could be. I simply don't know. It's possible that the Committee's finding will be that they're not critical of the laboratories' handling of that issue.

ASSEMBLYMAN BATES: I guess I didn't make myself clear. You've got one effort going here. I'm saying we want to also focus at the national level, to say that we believe it's an important question. We're looking at it, we've got our own people, but we think it's of significant importance that the entire nation should look at it and it should be given even a potentially broader review than our own committee.

DR. FRAZER: I think I just have to reseve judgment

until I see what our committee comes up with. It's obviously very appropriate for Congress to look at it. I would feel a bit presumptuous at the moment saying that I had a special reason to ask them to. We might.

ASSEMBLYMAN BATES: Can I ask maybe Dr. DeWitt if he would comment. Assuming the University -- and, you know, the reality is that the Regents have indicated their willingness to continue and it looks like something will be worked out.

What would you say -- and others may join in this. But what would you say would be important for this Legislature to do to try to get basically the kind of oversight kind of questions raised, the kind of things that have been discussed here today, the concerns you've brought to us? How can we have this happen and what role could we play to make sure that we did have a good presentation before the Congress, some kind of peer review in terms of information that was provided and some kind of check on the labs and what they're doing?

DR. DeWITT: I have great difficulty giving anything specific to answer your question, because I understand that the Regents exercise such very great power over all matters concerning the University. And the role of the state Legislature is primarily power of the purse. The Legislature can't exercise punitive action against the University for things it disapproves of, which would be very unfortunate for the student.

I guess my best answer to your question would be that if the Legislature gets interested, that they pass a

very strong resolution pressing the Regents to finally at last exercise some real oversight in all these matters that we've been discussing here today. Whether it could go beyond any kind of legislative remedies, I just don't know.

ASSEMBLYMAN BATES: Are there any suggestions -- for instance, I was under the impression that various people present testimony to Congress and some of that information is incorrect, we are told, some of that information is misleading.

Is there any sort of built-in peer review of that? In other words, that information -- is there anything that we could copy that was -- like maybe, as the intelligence community does, we would require internal review before people spoke on behalf of the labs before these various committees. Do other people have some suggestions?

DR. SCHWARTZ: On your last point -- I hope people in the lab will verify this -- it's my understanding that when laboratory officials go to Washington to testify before congressional hearings or to even high-level executive people, their presentations are in fact cleared through the upper management of the laboratory; exactly the opposite of what I think you're trying to get at.

So, I think there is that kind of structure. The question is: Is there a way to counterbalance that, to broaden it? Could one create, insist on a kind of peer review system?

I think that would be the most excellent thing that could be done. I would love to imagine that the University

would see that as its thoroughly appropriate mission to do that. If not and if the Legislature could find any ways to help make that happen, I think that would be excellent.

DR. DeWITT: Just one quick comment on the question of peer review or some kind of review of statements made by laboratory officials to the U.S. Congress.

Down through the years usually these statements made from the laboratory directors and by associate directors and laboratory experts to members of Congress simply are made going to the congressional record and are not usually seen again.

The laboratories have a very good relationship with, say, the House Armed Services Committee. There's very friendly relations. Unfortunately, the statements by the laboratory people are not often challenged. They should be. They're part of public record.

In recent years that's been changing a bit, I think, fortunately; because now there are at least a few members of Congress who deviate from what's been the old majority view of the House Armed Services Committee. So, the statements of the laboratory directors are getting back to the critics of the nuclear arms race around the country, including some of us inside the laboratory.

So, now in the last two or three years it's happening more and more that we see the statements by Roger Batzel, the director of Los Alamos, and other people at Livermore Laboratory and make our own immediate critiques to the members of the Congress. That's useful, it's

appropriate. Then, of course, occasionally we're called in, also, by Congress. I hope more of this will happen.

ASSEMBLYMAN BATES: Just one last thing. I was wondering if it would be possible for people to supply us with maybe a list of questions that we could in fact request the University to examine, scientific questions that need to be debated and discussed in an open forum and have that returned to the Legislature with some kinds of recommendations.

Maybe they would come back and say, this is not possible, there's too much debate. But at least where we could find some consensus of opinion around various issues like the reliability questions, the verification question; a number of pursuits that we could kind of request by resolution or some other method to have the University explore. That would be also of interest.

Madam Chair, I appreciate this hearing. I didn't intend to spend quite as much time as I did. I learned an awful lot. Too bad they didn't have this discussion when I had my resolution, because it would have been very helpful, I think.

CHAIRPERSON WATSON: I certainly do appreciate you staying and the interest you've taken and the questions you have raised.

Senator Rosenthal.

SENATOR ROSENTHAL: Let me just make a couple of personal observations.

If I had my choice, I would suggest that the

University is probably not the one to do the oversight. But that not being necessarily possible at this time, it seems to me that we ought to in some way declare the legislative intent that the Legislature and the Regents need to have improved oversight of the laboratories' activities that requires the Regents to establish a nuclear weapons oversight committee which shall be responsible for reporting to the extent possible permitted by federal law information concerning the nuclear weapons development programs of Livermore and Los Alamos to the Regents and to the Legislature.

It seems to me that unless the Legislature is satisfied at some point that the job is being done well, then we will not do anything about it. While it's sometimes difficult to say we are overseeing their budget and it may be harmful to students, sometimes that gets attention much more quickly than anything else we could do.

I think we should also require as part of the resolution an environmental impact report for any nuclear weapons designed by a testing project to also contain a detailed statement setting forth all possible adverse environmental consequences of the use or deployment of those nuclear weapons and we ought to have an urgency clause on that so that, again, the Regents and the Legislature would be informed about what's taking place.

We require environmental impact reports on all kinds of other things. You can't construct a prison in downtown Los Angeles without that requirement and we're talking about

something which is certainly much more significant.

So, it seems to me that at least we should have a couple of spot bills introduced to move in this particular direction. I'm certain there will be no shortage of positives for those kinds of issues.

CHAIRPERSON WATSON: Thank you so much, Senator Rosenthal.

I think he states the case well. The Committee has been pondering as to which direction it should take. I'd like in the future -- whether near or far -- to reconvene a similar group to discuss what you see are the environmental effects of continuation of contracting with the Department of Energy.

I am not satisfied that we touched on it hardly at all today. I am not satisfied that the University has shown any sensitivity to its social responsibility in that regard. Therefore, I think the suggestions that came from Senator Rosenthal might have their place.

In this last panel I heard about the Advisory Committee. I heard that you had a Health, Safety and Environmental Advisory Committee. But those are committees that have been established by the University. I think maybe it's now time that we look at the Legislature establishing committees. Certainly not to be composed of legislators, but to be composed of lay people with the expertise and probably some without that could give advice and could have a base for understanding what happens with these laboratories.

The reason why I think maybe lay people, too, is

because we need that balance; we need the people to be represented.

I do not want to pretend that we are the best experts, legislators. But who we are are policymakers and who we are are people who must hold some kind of accountability to the constituency out there. I think who we are are people who need to have a better base for making decisions. Therefore, we felt it was necessary to convene all of you here today.

I want to commend and congratulate every single panel. I think you've all been stellar. I think the debate has been intellectual, it has been informative and it certainly is not conclusive.

I am glad to know that the University allows the kind of dissent that we heard here. That ups the esteem in which I hold you.

I'm a graduate of the University of California. I think it's the finest institution in the world. That is the reason why I'm concerned about our policies. I'm concerned that the University feels that they are in a position to continue in that light that necessarily grows up when you're into this kind of contract; that if you really feel that there are questions that need to be raised by the academic community, you ought to be raising them.

With the amount of expertise that we have in the UC system, I would hope that that would be the place where the inquiry would begin. I would hope that that would be the place where scientists of the University and the

administration would say: Is it our mission to continue the arms struggle or is it our mission to provide for you the best scientific input with social responsibility?

I'm looking for that kind of balance and I'm thinking that you've created a world with the laboratories and this world is going to go on and so you must supply the Department of Energy and the Regents with the information that will continue the world in which you live. I'm a bit troubled by that. Because I do think that you in academia and we in the Legislature have a responsibility to say, let us raise some other questions.

So, I think that's what today has been all about. We have raised other questions. We have the input from the University as to how they go about maintaining the scientific research and development that they do. I think the whole question of reliability was probably addressed earlier in the day and I think that I'm not convinced that testing needs to continue based on the reliability factor. I'm not so sure if the University of California ought to be involved in the testing.

I think it's legitimate to have the University of California involved. I think there's a public service there. I do think the caliber of people that get involved with the laboratory is far superior of probably what they're doing in other institutions, but I don't know if the testing aspects ought to be a part of that.

This is information that all of us will have to admit we're not that familiar with. We certainly have our

feelings towards it.

So, I see this as a beginning of the dialogue. Senator Rosenthal laid out some paths that we might take. We'll probably discuss these spot bills that he speaks of in the Committee and with our colleagues that are not on the Committee as to whether we need to proceed with them or not. But that gives you some idea of the thinking of the Committee.

I certainly want to thank all of the people who are part of the Southern California Federation of Scientists and, in particular, John Bachar, Professor of Math at Cal State Long Beach, who brought the concept to my office and to the Committee, along with his colleagues. They have worked diligently and hard to get all of you here.

I think this has been a very successful day and I guess a very beneficial use of the time on both sides, the Committee and the witnesses.

So, I thank you and at four minutes to 5:00 we're going to adjourn. I would hope that those from the UC system would address the proposals as you heard them described by Senator Rosenthal to my office in writing as we discuss whether we want to pursue them or not.

So, I thank all of you for coming. I appreciate the kind of intelligent testimony we had here. This will not be the last of this kind of hearing.

With that, the Health and Human Services Committee forum is adjourned.

(Thereupon the hearing before the Senate Committee

on Health and Human Services was adjourned at 4:58 p.m.)

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CERTIFICATE OF SHORTHAND REPORTER

I, EILEEN JENNINGS, a Certified Shorthand Reporter of the State of California, do hereby certify:

That I am a disinterested person herein; that the foregoing hearing was reported in shorthand by me, Eileen Jennings, a Certified Shorthand Reporter of the State of California, and thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said hearing nor in any way interested in the outcome of said hearing.

IN WITNESS WHEREOF, I have hereunto set my hand this 11th day of March, 1987.

Eileen Jennings

EILEEN JENNINGS
Certified Shorthand Reporter
License No. 5122